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Alpine-Western Balkan rail freight corridor

CORRIDOR INFORMATION DOCUMENT

Book 5

Implementation Plan

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ÖBB INFRA
Slovenske železnice SŽ-Infrastruktura
HŽ INFRASTRUKTURA
Инфраструктура железнице Србије а. д.
ДП НАЦИОНАЛНА КОМПАНИЯ ЖЕЛЕЗОПЪТНА ИНФРАСТРУКТУРА

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1. Introduction

In 2010 the European Parliament and the Council adopted Regulation (EU) No 913/2010 concerning a European rail network for competitive freight, which entered into force on 9th November 2010 (hereinafter called Regulation), providing the establishment of international rail freight corridors for a European rail network for competitive freight. The idea of creating rail freight corridors is to harmonize different types of existing corridors, such as ERTMS- and RNE-corridors. They are also expected to be integrated with Core Network of the TEN-T Network. The purpose of creating rail freight corridors is to increase international rail freight transport by making them more attractive and efficient. The Regulation lays down rules for the establishment and organisation of international rail freight corridors for competitive rail freight. It sets out rules for the selection, organisation, management and the indicative investment planning of rail freight corridors.

A list of 9 initial rail freight corridors is annexed to Regulation, providing their respective latest implementation date in 2013 and 2015. The Annex to the Regulation has been replaced by the text of Annex II to the Regulation (EU) 1316/2013. Rail freight corridor network was further on extended for two more rail freight corridors by the Commission Implementing Decision (EU) 2017/177 for establishing the Amber rail freight corridor and the Commission Implementing Decision (EU) 2018/500 for establishing the Alpine-Western Balkan Rail Freight Corridor (hereinafter: AWB RFC).

In November 2017, a Letter of Intent was signed by the responsible Ministers of Austria, Slovenia, Croatia, Serbia and Bulgaria clearly expressing the political will of the parties to establish the “AWB RFC”. In March 2018, this corridor was approved by the European Commission and will now join the network of rail freight corridors succeeding all the previous activities and in particular the Association Corridor X Plus. Thanks to the joint efforts of the involved Infrastructure Managers supported by the respective Ministries this important milestone in the further development of a strong European rail network could be reached.

The proposed route of AWB RFC, Salzburg-Villach-Ljubljana-/Wels/Linz-Graz-Maribor-Zagreb-Vinkovci/Vukovar-Tovarnik-Beograd-Sofia-Svilengrad (Bulgarian-Turkish border), connects four EU Member States, namely Austria, Slovenia, Croatia and Bulgaria, and fully integrates the EU Candidate State Serbia. Moreover, the corridor creates the basis for better interconnections with Turkey at its Bulgarian-Turkish border crossing at Svilengrad.

AWB RFC is the first rail freight corridor at all that includes non EU member state (Serbia) in the European rail network for competitive freight. In this sense the establishment of AWB RFC widens the geographical coverage of the RFCs and helps to make the network for competitive rail freight services truly European.

Therefore, the traffic development along the AWB RFC should be considered in context of significant potential increase in the rail market share and consequent reduction of environmental externalities in terms of reduction of gas emissions and reduction of roads and highways congestion including the rational use of energy.

The rail freight corridors can be considered as the most suitable method to fulfil specific needs in the freight market. The aim is to enable freight trains running under high quality service and easily pass from one national network to another. The cooperation of infrastructure managers will be coordinated to the best possible extent by: governance, investment planning, capacity allocation, traffic management, providing a high quality service and introduce the concept of corridor one-stop shop.

The principal guidelines specified by the Regulation focus on:

- establishing a single place for designated capacity allocation on the corridor;
- closer cooperation and harmonization between infrastructure managers and member states both for the operational management of the infrastructures and for investments, in particular by putting in place a governance structure for each corridor;
- increased coordination between the network and terminals (maritime and inland ports and marshalling yards);
- the reliability of the infrastructure capacities allocated to international freight on these corridors;

The purpose of this document is to create an inventory of the tasks that result from the establishment of the AWB RFC, to present main characteristics of the corridor and to list measures which would make the corridor fully operational and improve the performance of rail freight traffic.

The geographical consistency between the TEN-T network and the network of RFCs is important as it ensures that the complementarity between these two corridor concepts can be fully exploited. In brief, TEN-T policy focuses on infrastructure development based on common standards and requirements whereas RFCs aim to create the conditions necessary to provide competitive rail freight services on that infrastructure.

In this regard it is important to notice that the proposed principal route of AWB RFC utilises lines that are either part of the TEN-T core network (for EU member states) or the indicative core network (in the case of Serbia) for most of its length.

Some sections of the lines in Austria and Slovenia are part of the comprehensive network only. However, these are necessary to ensure the link to the RFC network in Central and Western Europe via the link with Rhine-Danube RFC in Linz/Wels and Salzburg.

Even though the AWB RFC precedes the definition of a potential TEN-T core network corridor on this axis, the conditions to ensure consistency between the RFC network and the TEN-T network are given.

RailNetEurope (RNE) corridors were established prior to the RFCs based on Regulation (EU) 913/2010 and were similar to RFCs in terms of objectives, scope and services and tools offered. By 2015, the routes of all former RNE corridors (except one) have been integrated in the network of RFCs. RNE corridors could thus be considered as RFCs *avant la lettre*.

RNE corridor C11 was established in 2010 on the route from Munich to Istanbul to improve the conditions for international rail freight traffic.[1] As its central part, it included the main route of AWB RFC from Salzburg to the Bulgarian/Turkish border. RNE corridor C11 was operational until the end of 2016. By that time it has become the only RNE corridor not incorporated in the RFC network. This unique situation – as well as the prospect of a future RFC along the same route – led to a temporary suspension of activities related to RNE corridor 11.

The legacy of RNE corridor C11 has two key implications: Firstly, it demonstrates that the route of AWB RFC is indeed an integral part of a comprehensive network for rail freight in Europe. Secondly, it means that work and results achieved in the context of the RNE corridor can be built upon in a new RFC framework.

Some studies and activities in the transport field of the Region indicate the importance and potential of the developed rail freight sector besides the passenger one. The South East European Transport Axis Cooperation (called SEETAC) Project, co-financed by the EU funds, besides transport flows analyses assessed the environmental and socio-economic benefits (in its Working Package 4) of rationally developed transport system in the Region. It was underlined that such corridor might contribute to extended cooperation in the region also in relation to political stability.

Recent studies confirm a clear need to catch up in terms of transport infrastructure standards and quality in the (Western) Balkans region, in particular regarding rail.[2,3] However, another

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[1] See http://cis.rne.eu/tl_files/RNE_Upload/Corridor/C11/C11.pdf

[2] IBRD (2015). The Regional Balkans Infrastructure Study (REBIS) Update, Report No. 100619-ECA, The International Bank for Reconstruction and Development, Washington DC, September 2015

[3] CEI (2015). ACROSSEE project, Transnational Cooperation Programme "South East Europe", SEE/D/0093/3.3/X, Central European Initiative (consortium leader).

key conclusion is that in addition to infrastructure improvements the use of the existing infrastructure should be also improved.

This conclusion is based on the observation that the rail network in the AWB RFC region is currently severely underutilised. The development of rail freight traffic is not constrained by a lack of capacity (which is generally a costly issue to be resolved) but by the poor state of infrastructure (due to the lack of maintenance) and technical, regulatory and operational constraints. The establishment of the AWB RFC can help to overcome at least some of these limitations.

The removal of bottlenecks not (mainly) caused by infrastructure typically requires relatively limited resources. The strong legal basis provided by a rail freight corridor, involving key actors in the RFC governance structure (ministries, infrastructure managers, applicants including railway undertakings, terminals and others) will provide an appropriate framework to address such issues.

The proposed AWB RFC complements the RFCs pre-existing in the South-Eastern European region, notably by:

- adding new links, providing access to regions so far not covered by the network of RFCs;
- by adding new relations covered by combination of AWB and other RFCs, thereby strengthening the network effect of the RFCs;
- by providing routing alternative to the existing RFCs, thereby enhancing the resilience of the RFC network, i.e. its functioning in case of major service disruptions (such as the recent incident on the Rhine-Alpine RFC at Rastatt);

In total, the principal route of AWB RFC connects five other RFCs: Baltic – Adriatic Rail Freight Corridor, Mediterranean Rail Freight Corridor, Amber Rail Freight Corridor, Orient/East Mediterranean Rail Freight Corridor and after the extension the Rhine-Danube Rail Freight Corridor.

This makes AWB RFC a fully integrated component of the European rail network for competitive freight.

Furthermore, the AWB RFC provides an alternative routing in Northwest/Southeast direction to the Orient/East-Med (established in 2013) and the Rhine-Danube corridor (to be established by 2020). The distance between Linz (AT) and Svilengrad (BG, border crossing to TR), is approximately 1580 km via the AWB RFC , whereas the same relation via the Orient/East-Med and Rhine-Danube RFCs is 1,750 km (via the Vidin/Calafat, Curtici/Lököshaza and Hegyeshalom/Nickelsdorf border crossings).

Offering a route about 160 km, or 9%, shorter than the route via Orient/East-Med and Rhine-Danube RFC, AWB RFC thus adds an attractive alternative for flows from Central Europe to Turkey and beyond.

In addition, the AWB RFC would also complement the Orient/East-Med and Rhine-Danube RFCs by providing a useful and viable diversionary route in case of major capacity restrictions along their routes. This would be particularly helpful as (i) the availability of diversionary routes providing adequate standards is generally limited in this part of Europe and (ii) as the significant rehabilitation works planned in the region may imply significant capacity restrictions in the short and medium term.

The AWB RFC route is the key rail axis in the Western Balkans region, both in terms of passengers and of freight. A recent study by the International Bank for Reconstruction and Development[4] estimates that rail freight flows reach 12,000 to 14,000 tons per day on the most heavily used sections, in the Zagreb and Belgrade areas. This is equivalent to about 3 to 5 million tons of freight per year.[5]

The significant potential of the AWB RFC is underlined by the fact that prior to the dissolution of Yugoslavia – which ended the functioning of the corridor as a seamless transport axis – the volume of transit goods transported along this route was about the double of the current figures: In 1989, approximately 8 million tons were shipped by rail along the corridor. One of the key reasons for the decrease in volumes is a shift of transit traffic to routes further north. The current market share of the AWB RFC route in this traffic is estimated at only 10%.

[5] IBRD (2015). The Regional Balkans Infrastructure Study (REBIS) Update, Report No. 100619-ECA, The International Bank for Reconstruction and Development, Washington DC, September 2015

[5] The study does not specify whether the daily volumes refer to 365 days per year or to work days only (around 300 days).

2. Corridor Description

The designation of all AWB RFC lines, according to the definition of “freight corridor” specified by the Regulation (EU) 913/2010, has been developed by the Management Board in cooperation with the concerned Infrastructure Managers and the Advisory Groups based on general orientation given by the Letter of Intent signed by the responsible Ministers.

The selection of railway lines and terminals is based on current and expected traffic patterns and information provided by the Infrastructure Managers and the results of the Transport Market Study.

All AWB RFC nodes included in the Commission Implementing Decision (EU) 2018/500 have been adequately incorporated into this Corridor

Designated lines, coincide with those largely used today. Besides the principal lines along the Corridor route outlined in the Commission Implementing Decision (EU) 2018/500, the Corridor also includes the diversionary lines frequently used for re-routing the trains in case of disturbance on the principal lines and connecting lines, sections linking terminals and freight areas to the principal lines.

In some cases, parallel railway lines have been included in order to provide sufficient capacity in this corridor.

The terminals with relevance to the traffic on the Corridor are designated as well. The terminals with relevance to rail freight traffic along the principal Corridor route are especially:

- marshalling yards;
- major rail-connected freight terminals;
- rail-connected intermodal terminals;

Designated railway lines and terminals along the Corridor are described in this Implementation Plan by the maps and the tables with detailed technical parameters included.

The Implementation Plan also provides the information on bottlenecks along the Corridor as well as the IMs investment plan with the aim to harmonize the relevant infrastructure parameters along the Corridor such as: train lengths, train gross weights, axle loads and loading gauges, and the possibility to remove the bottlenecks. Also, there is the information on ERTMS deployment plan which is a very important issue for the future rail freight traffic.

2.1. Key Parameters of Corridor Lines

The AWB RFC designated lines consist of three different categories of lines:

- **Principal routes:** on which PaPs are offered;
- **Diversionary routes:** on which PaPs may be considered temporarily in case of disturbances, e.g. long-lasting major construction works on the principal lines;
- **Connecting lines:** lines connecting the corridor lines to a terminal (on which PaPs may be offered but without an obligation to do so). It is a routing bypassing places (where alternative options exist) on the principle route - related routes and destinations and PaPs apply;

According to the table shown below the total length of the AWB RFC principal lines is approximately 2114 km and 31 km of connected lines.

	Total lines length	Principal lines	Diversionary lines	Connecting lines	Expected lines
Austria	**528**	**528**	**0**	**0**	**0**
Slovenia	**294**	**294**	**0**	**0**	**0**
Croatia	**376**	**345**	**0**	**31**	**0**
Serbia	**564**	**564**	**0**	**0**	**0**
Bulgaria	**383**	**383**	**0**	**0**	**0**
Total (km)	**2145**	**2114**	**0**	**31**	**0**

The only connecting railway line which connects the AWB RFC principal line and the terminal is the railway line Vinkovci - Spačva (31 km).

Guided by the provisions of the Handbook for International Contingency Management adopted by RNE General Assembly (16 May 2018), endorsed by PRIME and the RU Dialogue and acknowledged by important European sector associations, the AWB RFC Capacity, Operations & Performance WG will define the diversionary lines designated for the train re-routing in case of disturbances. An overview will be available on the website: www.rfc-awb.eu

Also, according to the conclusions of the AWB RFC Transport Market Study, the line Ljubljana - Novo Mesto- Karlovac - Zagreb could be the bypass line in case of total closure of the line Ljubljana - Zidani Most - Zagreb. After the modernisation, this line has a potential to be a diversionary route of the AWB RFC. In this regard the line Trebnje - Sevnica is also envisaged as possible diversionary route.

The purpose of diversionary lines designation is to inform all the users of the Corridor, especially the railway undertakings, which possibilities of rerouting the trains exist in case of disruption of traffic on principal lines.

The AWB RFC re-routing overview shows pre-defined, categorised re-routing lines and is publicly available. These re-routing options include all relevant and available information regarding technical parameters, other operational requirements and a rough indication of capacity (volume), but not describing precise available capacity on any foreseen re-routing line.

For line sections with limited re-routing options, scenarios with specific traffic management measures for an ad-hoc line closure will be prepared by the member infrastructure managers of the AWB RFC.

There are about 21 terminals and 12 marshaling yards designated to the AWB RFC according to the following distribution:

- Austria: 8 terminals; 4 marshaling yards
- Slovenia: 3 terminals; 1 marshaling yard
- Croatia: 5 terminals; 1 marshaling yard
- Serbia: 3 terminals; 2 marshaling yards
- Bulgaria: 2 terminals; 4 marshaling yards

For designated lines of the AWB RFC, there is an overview of main important infrastructure parameters relevant for rail freight traffic, including:

- type of line: principal, diversionary or connecting/feeder;
- section length (km);
- track gauge;
- number of tracks;
- maximum train length including traction;
- maximum axle load;
- maximum load per meter;
- maximum train speed;
- maximum loading gauge;
- power supply and voltage for electrified lines;
- train protection system;
- maximum line gradient in both directions of the corridor (NS – from Salzburg to Svilengrad and SN from Svilengrad to Salzburg);

The maps with the above mentioned key technical parameters of the Corridor respective lines are shown below.

Number of tracks

Maximum train length including traction

Maximum axle load

Maximum load per metre

Maximum train speed

Loading gauge

Intermodal loading gauge

No necessary codification has been performed at the Serbian railway network. The intermodal units are transported as the "extraordinary consignments".

Power supply

Train protection system

Gradient NS


Alpine-Western Balkan
rail freight corridor
GRADIENT NS:
LEGEND:
0 - 4
5 - 7
8 - 10
11 - 14
15 - 30
0-(-4)
(-5)-(-7)
(-8)-(-10)
(-11)-(-14)
(-15)-(-30)
Vienna
Linz
Marchtrenk
Wels
Traun
Salzburg
Bischofshofen
Schwarzach St.Veit
Selzthal
St. Michael
Bruck a.d. Mur
Graz
Spittal-Millstättersee
Villach
Rosenbach
Jesenice
Spielfeld
Šentilj
Maribor
Pragersko
Ljubljana
Zidani Most
Dobova
Savski Marof
Zaprešić
Sesvete
Zagreb ZK
Dugo Selo
Zagreb
Zagreb RK
Banova Jaruga
Novska
Nova Kapela-Batrina
Strizivojna
Vrpolje
Vinkovci
Vukovar
Tovarnik
Šid
Ruma
Golubinci
Stara Pazova
Batajnica
Beograd
Beograd Ranžirna
Rakovica
Resnik
Mala Krsna
Velika Plana
Lapovo
Stalać
Niš Ranžirna
Dimitrovgrad
Kalotina Zapad
Kalotina
Dragoman
Aldomirovtsi
Voluyak
Sofia
Kazichene
Vakarel
Septemvri
Stamboliyski
Plovdiv
Krumovo
Katunitsa
Dimitrovgrad
Simeonovgrad
Popovitsa
Svilengrad

Gradient SN


Alpine-Western Balkan
rail freight corridor
GRADIENT SN:
LEGEND:
0 - 4
5 - 7
8 - 10
11 - 14
15 - 30
0-(-4)
(-5)-(-7)
(-8)-(-10)
(-11)-(-14)
(-15)-(-30)
Vienna
Linz
Marchtrenk
Wels
Traun
Salzburg
Bischofshofen
Schwarzach St.Veit
Selzthal
St. Michael
Bruck a.d. Mur
Graz
Spittal-Milstättersee
Villach
Rosenbach
Jesenice
Spielfeld
Šentilj
Maribor
Pragersko
Ljubljana
Zidani Most
Dobova
Savski Marof
Zaprešić
Sesvete
Zagreb ZK
Dugo Selo
Zagreb
Zagreb RK
Banova Jaruga
Novska
Nova Kapela-Batrina
Strizivojna
Vrpolje
Vinkovci
Vukovar
Tovarnik
Šid
Ruma
Golubinci
Stara Pazova
Batajnica
Beograd
Beograd Ranžirna
Rakovica
Resnik
Mala Krsna
Velika Plana
Lapovo
Stalać
Niš Ranžirna
Dimitrovgrad
Kalotina Zapad
Kalotina
Dragoman
Aldomirovtsi
Voluyak
Sofia
Kazichene
Vakarel
Septemvri
Stamboliyski
Plovdiv
Krumovo
Katunitsa
Popovitsa
Dimitrovgrad
Simeonovgrad
Svilengrad

The comprehensive list of the technical parameters of the Corridor respective lines are shown bellow.

AUSTRIA

		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGTH INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE	POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
OBB	Graz - Border next to Spielfeld/Straß	48,70	x			x												x				x			x				x	80/410	GA, G1, G2	x			PZB	7	7
	Bruck a.d. Mur - Graz	53,50	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	7	7
	Bruck a.d. Mur - St. Michael	25,90	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	13	13
	St. Michael - Selzthal	63,30	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	15	15
	Traun - Selzthal	96,10	x			x												x				x			x				x	80/410	GA, G1, G2	x			PZB	21	21
	Linz - Traun	8,10	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	26	26
	Marchtrenk - Traun	13,19	x			x												x				x			x				x	80/410	GA, G1, G2	x			PZB	12	12
	Marchtrenk - Wels	6,60	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	13	13
	Villach - Staatsgrenze next to Rosenbach	29,98	x			x												x				x			x			x		80/410	GA, G1, G2	x			PZB	22	22
	Spittal-Milstättersee - Villach	35,70	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	6	6
	Schwarzach-St. Veit - Spittal-Milstättersee	80,90	x			x												x				x		x	x				x	80/410	GA, G1, G2	x			PZB	29	29
	Bischofshofen - Schwarzach-St. Veit	14,20	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	10	10
	Salzburg - Bischofshofen	52,30	x			x		x										x				x			x				x	80/410	GA, G1, G2	x			PZB	11	11
PZB	Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control																																				

SLOVENIA

		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT * INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
SŽ-I	*St. border - Dobova - Zidani Most **	51	X			X		X					x									x		x			X			P/C 99/429	GB			x		PZB + ETCS L1	0_5	0_5
	*Zidani Most - Ljubljana **	64	X			X		X					x									x		x		x				P/C 99/429	GB			x		PZB + ETCS L1	0_5	0_5
	*Ljubljana - Jesenice - St. border **	71	X			X						x										x		x			x			P/C 99/429	GB			x		PZB	15_20	5_10
	Zidani Most - Pragersko	73	X			X		X										x				x			x			x		P/C 90/410	GC			x		PZB + ETCS L1	5_10	5_10
	Pragersko - Maribor	18	X			X		X										x				x			x				x	P/C 80/400	GC			x		PZB + ETCS L1	0_5	0_5
	Maribor - Šentilj - St. border	17	X			X												x				x			x		x			P/C 80/400	GC			x		PZB	5_10	5_10

* In particular exceptional cases trains exceeding maximum permitted length also can run on particular rail lines (not more than 740 m). The permission for exceeding train length on certain line is issued by the IMs' main traffic dispatcher. The permission is issued in accordance with the actual capacities of the line and traffic situation, provided that the train shall not hinder the scheduled traffic of other trains. (Network Statement, Chapter 3.3.2.5)

CROATIA

	Section	SECTION LENGHT km	LINE TYPE PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	TRACK GAUGE 1435 mm	1520 mm	DOUBLE TRACK	MAX. TRAIN LENGTH INCL. TRACTION 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m
HŽI	Savski Marof St. Bor. - Savski Marof	5,092	X			X		X						X				
	Savski Marof - Zaprešić	6,540	X			X		X						X				
	Zaprešić - Zagreb Zap. Kolodvor	13,008	X			X		X						X				
	Zagreb Zap. Kolodvor - Zagreb RK	10,685	X			X		X***						X				
	Zagreb RK - Sesvete	11,981	X			X		X						X				
	Sesvete - Dugo Selo	10,156	X			X		X						X				
	Dugo Selo - Banova Jaruga	66,932	X			X							X					
	Banova Jaruga - Novska	17,279	X			X											X	
	Novska - Nova Kapela Batrina	56,618	X			X		X						X				
	Nova Kapela Batrina - Strizivojna Vrpolje	62,590	X			X		X						X				
	Strizovojna Vrpolje - Vinkovci	31,937	X			X		X							X			
	Vinkovci - Tovarnik	32,375	X			X		X							X			
	Vinkovci - Vukovar	18,542	X			X				X								
	Tovarnik - Tovarnik St. Bor.	1,547	X			X		X									X	

	Section	AXLE LOAD 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE UIC Guideline	LOADING GAUGE Lines	Tunnels	POWER SUPPLY DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE) ‰ towards NS	‰ towards SN
HŽI	Savski Marof St. Bor. - Savski Marof				X			X				X	80/410	GC				X	SI	0	3
	Savski Marof - Zaprešić				X			X	X				80/410	GC				X	PZB	1	1
	Zaprešić - Zagreb Zap. Kolodvor				X			X	X				80/410	GC*				X	PZB	3	3
	Zagreb Zap. Kolodvor - Zagreb RK				X			X	X				80/410	GC				X	PZB	3	4
	Zagreb RK - Sesvete				X			X				X	80/410	GC				X	PZB	6	5
	Sesvete - Dugo Selo				X			X				X	80/410	GC				X	PZB	1	5
	Dugo Selo - Banova Jaruga				X			X		X			80/410	GC*				X	PZB	5	5
	Banova Jaruga - Novska				X			X		X			80/410	GC*				X	PZB	4	3
	Novska - Nova Kapela Batrina				X			X				X	80/410	GC				X	PZB/ETCS L1**	6	6
	Nova Kapela Batrina - Strizivojna Vrpolje				X			X				X	80/410	GC				X	PZB	5	6
	Strizovojna Vrpolje - Vinkovci				X			X				X	80/410	GC				X	PZB	4	3
	Vinkovci - Tovarnik				X			X				X	80/410	GC				X	PZB/ETCS L1**	4	6
	Vinkovci - Vukovar		X					X	X				80/410	GC					SI	5	5
	Tovarnik - Tovarnik St. Bor.				X			X			X		80/410	GC				X	SI	0	1

* GB	for section Zaprešić - Zagreb Zap. kolodvor bridge Krapina and fence between tracks; section Dugo Selo - Kutina bridge Česma; section Kutina - Banova Jaruga bridge Ilova; section Banova Jaruga - Novska bridge Pakra
SI	Station Interdependence
PZB	Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control
** ETCS level 1	Novska - Okučani
***	Double track on section Zagreb Klara - Zagreb RK
	Opposite direction of the section Zagreb Zap. Kolodvor - Zagreb RK OS is 139 m shorter

SERBIA

		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	750 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
IŽS	St. Border - Šid	6	X			X		☑									☑					X		X			X	X			GB	GB			X	ID	4	1
	Šid- Ruma	52	X			X		☑						☑								X		X		X		X			GB	GB			X	PZB+CTC	3	4
	Ruma- Golubinci	20	X			X		☑									☑					X		X				X	X		GB	GB			X	PZB+CTC	6	6
	Golubinci- Stara Pazova	9	X			X		☑									☑					X		X			X		X		GB	GB			X	PZB+CTC	3	9
	Stara Pazova- Batajnica	14	X			X		☑									☑					X		X		X					GB	GB			X	PZB+CTC	1	3
	Batajnica- Beograd Ranžirna	26	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	7	8
	Beograd Ranžirna- Resnik	10	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	17	11
	Beograd Ranžirna- Rakovica- Mala Krsna- Velika Plana	99	X			X							☑									X			X	X		X			GB	GB			X	PZB+CTC	13	10
	Resnik- Velika Plana	76	X			X											☑					X			X	X		X			GB	GB			X	PZB+CTC	15	15
	Velika Plana- Lapovo	19	X			X		☑					☑									X			X	X		X			GB	GB			X	PZB+CTC	5	6
	Lapovo- Stalać	64	X			X		☑					☑									X			X	X	X	X	X		GB	GB			X	PZB+CTC	5	4
	Stalać-Niš Ranžirna	62	X			X		☑*				☑										X			X	X	X	X			GB	GB			X	PZB+CTC	7	6
	Niš Ranžirna-Dimitrovgrad	101	X			X						☑										X		X		X		X			GB	GB			X	ID	10	6
	Dimitrovgrad- St. Border Serbia/Bulgaria	7	X			X											☑					X			X		X				GB	GB			X	ID	12	-

* double track Đunis - Trupale; single tracks Stalać - Đunis and Trupale - Niš ranžirna

Please give the explanation for abbreviation and special marks!!

PZB - Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control

CTC - Centralized traffic control

ID - Inter station Dependence

BULGARIA

		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGTH INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS [3]	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520		≤ 200 m	≤ 360 m	≤ 450 m	≤ 500 m	≤ 550 m	≤ 575 m	≤ 600 m	≤ 625 m	≤ 650 m	≤ 740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS [1]	‰ towards SN [2]
NRIC	St. Border Serbia/Bulgaria - Kalotina Zapad	0,800	X			X											x					X			X	X				59/389	GB				X	RSABS	7,2	
NRIC	Kalotina Zapad - Kalotina	2,000	X			X				X												X			X	X				59/389	GB				X	RSABS	20,5	
NRIC	Kalotina - Dragoman	11,720	X			X											x					X			X	X				59/389	GB				X	RSABS	21,0	
NRIC	Dragoman - Aldomirovtsi	7,052	X			X												X				X			X	X				59/389	GB				X	RSABS	-18,5	
NRIC	Aldomirovtsi - Voluyak	27,435	X			X											x					X			X	X				59/389	GB				X	RSABS	-20,5	
NRIC	Voluyak - Sofia	7,793	X			X		X										x				X			X	X				59/389	GB				X	RSABS	-9,7	9,2
NRIC	Sofia - Kazichene	14,353	X			X		X										x				X			X	X				59/389	GB				X	ABS + ACS	-9,6	9,6
NRIC	Kazichene -Vakarel	24,919	X			X		X							x							X			X	X				59/389	GC				X	ABS + ACS	25,0	-25,0
NRIC	Vakarel - Septemvri	63,526	X			X		X										x				X			X	X				59/389	GC				X	ABS + ACS	-25,0	25,0
NRIC	Septemvri - Stamboliyski	35,361	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	8,0	6,5
NRIC	Stamboliyski - Plovdiv	17,155	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-7,1	7,1
NRIC	Plovdiv - Krumovo	11,698	X			X		X										x				X			X		X			59/389	GB				X	ABS + ECTS-L1	2,5	-2,5
NRIC	Krumovo - Katunitsa	4,887	x			x												x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	1,6	
NRIC	Katunitsa - Popovitsa	16,913	x			x		x										x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	-7,5	7,5
NRIC	Popovitsa - Dimitrovgrad	46,799	x			x											x					x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	10,0	
NRIC	Dimitrovgrad - Simeonovgrad	27,031	X			X											x					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	12,0	
NRIC	Simeonovgrad - Svilengrad	40,522	X			X											x					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	10,0	
NRIC	Svilengrad - St. Border Bulgaria/Turkey	18,862	X			X																X			X				X	59/389	GC				X	RSABS	8,8	
NRIC	Svilengrad - St. Border Bulgaria/Greece	3,890	X			X																X			X		X			59/389	GC				X	RSABS	8,0	

Remarks

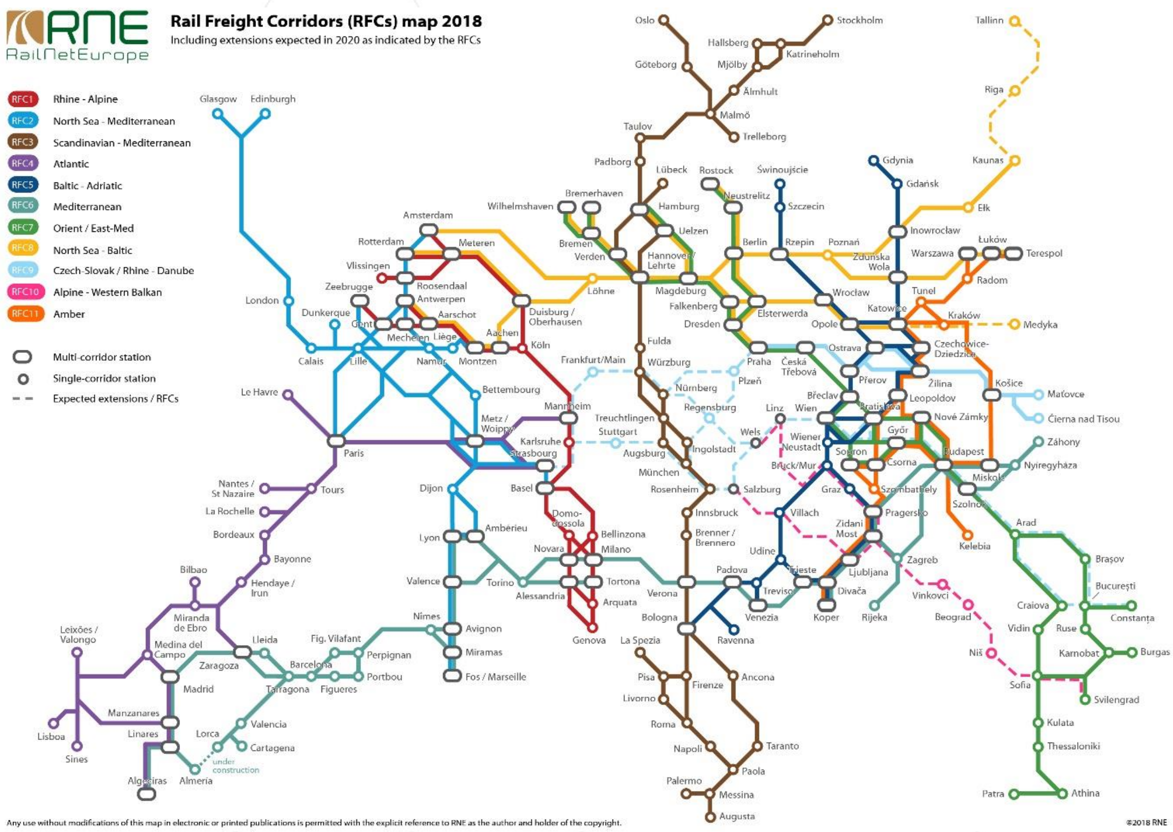
[1] - maximum longitudinal gradient of track N1 in the direction of travel of the route from the second column; the "+" sign means climb, the "-"descent

[2] - in case of double track - maximum longitudinal slope of track N2 opposite to the direction of movement of the route from the second column; the "+" sign means climb, the "-"descent

[3] - systems for providing and controlling the movement of trains: automatic blocking sistems with axle counters without trought signals - ABS-AC; automatic blocking sistems with trought signals - ABS; relay semi-automatic blocking sistem - RSABS; automatical cab sistem - ACS; european train control sistem level 1 - ETCS-L1.

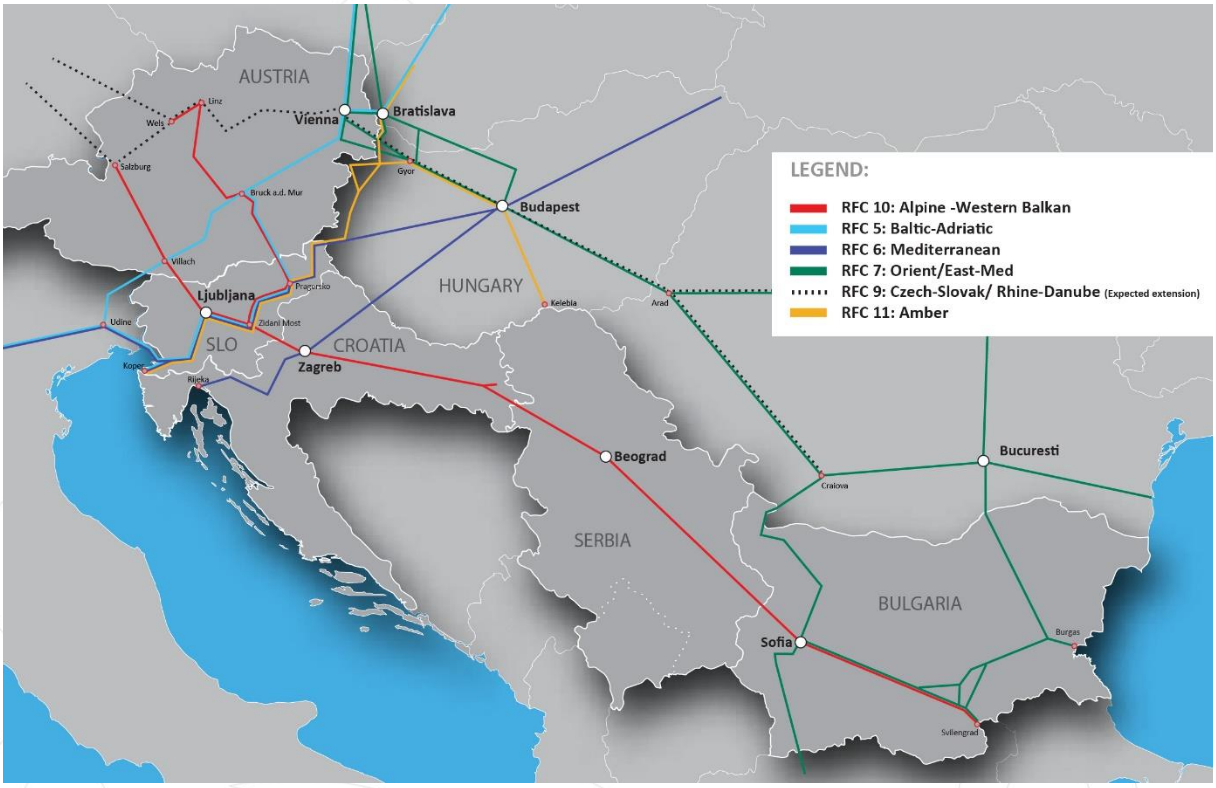
Connections with Other Corridors

So far, 10 RFCs have already been established in Europe and the AWB RFC will be the 11th one when it becomes operational in March 2020.



The AWB RFC is a key rail axis in the Western Balkans region and provides a direct link between Western/Central Europe and Turkey at the Bulgarian-Turkish border.

Correlation with other RFCs corridors



The AWB RFC is overlapping with several other rail freight corridors and is connected in many locations with them, namely:

- in Salzburg, Wels and Linz with Rhine-Danube Corridor (expected extensions)
- in Villach, St. Michael and Bruck/Mur with Baltic – Adriatic Rail Freight Corridor
- in Ljubljana with Baltic – Adriatic Rail Freight Corridor, Mediterranean Rail Freight Corridor and Amber Rail Freight Corridor
- in Pragersko with Mediterranean Rail Freight Corridor, Baltic – Adriatic Rail Freight Corridor and Amber Rail Freight Corridor
- in Zagreb RK and Dugo Selo with Mediterranean Rail Freight Corridor
- in Sofia with Orient/East Mediterranean Rail Freight Corridor

AUSTRIA

Overlapping sections	***RFCs involved***	***IMs involved***	***Section length (km)***
Graz - Border next to Spielfeld/Straß	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	49
Graz - Bruck a.d. Mur	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	54
Bruck a.d. Mur - St. Michael	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	26
Villach - Villach Süd Gvbf	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	6

SLOVENIA

Overlapping sections	***RFCs involved***	***IMs involved***	***Section length (km)***
St. border - Dobova - Zidani Most	Mediterranean RFC AWB RFC	ÖBB-I, SŽ-I, MÁV, RFI, ADIF, SNCF, HŽI, IŽS, NRIC	51
Zidani Most - Ljubljana	Baltic – Adriatic RFC Mediterranean RFC Amber RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, GYSEV, MÁV, VPE, RFI, ADIF, SNCF, HŽI, IŽS, NRIC	64
Zidani Most - Pragersko	Baltic – Adriatic RFC Mediterranean RFC Amber RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, GYSEV, MÁV, VPE, RFI, ADIF, SNCF, HŽI, IŽS, NRIC	73
Pragersko - Maribor	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	18
Maribor - Šentilj - St. border	Baltic – Adriatic RFC AWB RFC	PKP, ŽSR, SŽDC, ÖBB-I, SŽ-I, HŽI, IŽS, NRIC	17

CROATIA

Overlapping sections	***RFCs involved***	***IMs involved***	***Section length (km)***
St. Bor. - Savski Marof - Zagreb ZK	AWB RFC Mediterranean RFC	ADIF, LFP, SNCF, O'CVIA, RFI, SŽ-I, HŽI, MÁV, ÖBB-I, IŽS, NRIC	24
Zagreb ZK - Zagreb RK	AWB RFC Mediterranean RFC	ADIF, LFP, SNCF, O'CVIA, RFI, SŽ-I, HŽI, MÁV, ÖBB-I, IŽS, NRIC	11
Zagreb RK - Dugo Selo	AWB RFC Mediterranean RFC	ADIF, LFP, SNCF, O'CVIA, RFI, SŽ-I, HŽI, MÁV, ÖBB-I, IŽS, NRIC	22

SERBIA

In Serbia there are no overlapping sections with other corridors as for the moment in Serbia there is only the AWB RFC.

BULGARIA

Overlapping sections	***RFCs involved***	***IMs involved***	***Section length (km)***
Sofia - Kazichene	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	14
Kazichene -Septemvri	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	88
Septemvri - Plovdiv	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	53
Plovdiv - Dimitrovgrad	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	76
Dimitrovgrad - Simeonovgrad	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	24
Simeonovgrad - Svilengrad	AWB RFC Orient/East Mediterranean RFC	DB Netz, ÖBB-I, SŽDC, ŽSR, MÁV, GYSEV, VPE, CFR, OSE, SŽ-I, HŽI, MÁV, ÖBB, IŽS, NRIC	41

2.2. Corridor Terminals

In the Regulation (EU) 913/2010, terminals are very extensively defined. They are defined as the installation provided along the freight corridor which has been specially arranged to allow either the loading and/or the unloading of goods onto/from freight trains, and the integration of rail freight services with road, maritime, river and air services, and either the forming or modification of the composition of freight trains; and, where necessary, performing border procedures at borders with European third countries.

In general, the Corridor terminals, such as combined transport terminals, river ports, multimodal platforms, rail freight terminals are the terminals with the influence on the corridor freight flows and are to be sufficiently connected to the corridor.

There are a number of terminals with relevance for traffic flows on the AWB RFC which has been indicated on the basis of national assessment and evaluation.

For the time being 21 intermodal terminals and 12 marshalling yards are designated to the AWB RFC route as follows:

Terminals map

Terminals

Country	***Railway hub***	***Terminal name***	***Rail***	***Road***	***River***
Austria	Salzburg	Salzburg CTS	x	x	
Austria	Salzburg	Salzburg Frachtenbahnhof - ROLA	x	x	
Austria	Villach	Villach Süd CCT (Fürnitz)	x	x	
Austria	Wels	Wels Vbf. CCT ROLA	x	x	
Austria	Lambach	Lambach	x	x	
Austria	Linz	Linz Stadthafen CCT	x	x	x
Austria	St. Michael	St.Michael	x	x	
Austria	Graz	Werndorf	x	x	
Slovenia	Maribor	Maribor Tezno KT	x	x	
Slovenia	Celje	Celje tovorna KT	x	x	
Slovenia	Ljubljana	Ljubljana Moste KT	x	x	
Croatia	Zagreb	Kontejnerski terminal Vrapče	x	x	
Croatia	Zagreb	Robni Terminali Zagreb	x	x	
Croatia	Slavonski Brod	Luka Slavonski Brod	x	x	x
Croatia	Vukovar	Luka Vukovar	x	x	x
Croatia	Vinkovci	ROLA Terminal Spačva	x	x	
Serbia	Sremska Mitrovica	Leget Sremska Mitrovica	x	x	x
Serbia	Beograd	Surčin Nelt Dobanovci	x	x	
Serbia	Beograd	ŽIT BEOGRAD	x	x	

Bulgaria	Dragoman	RO-LA Dragoman	x	x	
Bulgaria	Plovdiv	Todor Kableshkov - Zlatitrap RO-LA	x	x	

Marshalling yards

Country	***Railway Hub***	***Marshalling yard***
Austria	Salzburg	Salzburg
Austria	Villach	Villach
Austria	Wels	Wels
Austria	Graz	Graz
Slovenia	Ljubljana	Ljubljana Zalog
Croatia	Zagreb	Zagreb Ranžirni kolodvor
Serbia	Beograd	Beograd Ranžirna
Serbia	Niš	Niš Ranžirna
Bulgaria	Sofia	Volujak
Bulgaria	Sofia	Iskar
Bulgaria	Plovdiv	Plovdiv Razpredelitelna
Bulgaria	Dimitrovgrad	Dimitrovgrad

More detailed information on the terminals is provided in Book 3 of Corridor Information Document.

2.3. Bottlenecks

The AWB RFC will carry out the “Capacity Improvement and Operational Bottleneck Study”. All the analyses, assessments and classifications will be made upon the definition of bottlenecks set in (15) of Definitions Article 2 of Regulation (EU) No 1316/2013. Bottleneck means a physical, technical or functional barrier which leads to a system break affecting the continuity of long-distance or cross - border flows and which can be surmounted by creating new infrastructure, or substantially upgrading existing infrastructure, that could bring significant improvements which will solve the bottleneck constraints.

According to Article 39 of Regulation (EU) No 1315/2013, the following infrastructure requirements for the key technical parameters shall be met by the infrastructure of the core network:

- full electrification of the line tracks and, as far as necessary for electric train operations, sidings;
- at least 22.5 t axle load;
- 100 km/h line speed;
- possibility of running trains with a length of 740 m;
- full deployment of ERTMS;
- nominal track gauge for new railway lines: 1 435 mm except in cases where the new line is an extension on a network the track gauge of which is different and detached from the main rail lines in the Union;

The AWB RFC does not fully belong to the core network, but the corridor's aim is to comply, as much as possible, with the core network requirements for the infrastructure parameters. According to AWB RFC Transport Market Study special attention must be given to eliminate bottlenecks on the single track railway lines with capacity consumption over 100 %. However, it should be taken into account that a single railway line itself is not necessarily an indication of a capacity bottleneck.

Bellow is provided a description of the main bottlenecks identified along the corridor, obtained from the Infrastructure Managers.

This overview could help the States, infrastructure managers and other stakeholders to identify key infrastructure projects and capacity projects, which would contribute to the possible removal of bottlenecks.

In Chapter 6 Investment Plans there is the information on potential benefits in case of bottlenecks removal.

AUSTRIA

All lines of the AWB RFC in Austria fulfill the criteria of 22.5 t axle load already in 2019.

All lines of the AWB RFC in Austria fulfill the criteria of 100km/h line speed in the main parts of the line sections already in 2019. There are no further plans to increase the speed in lower sections beside the projects mentioned below.

All lines of the AWB RFC in Austria fulfill the criteria of running 740m train already in 2019. There are plans to increase the capacity for 740m train by implementing additional longer sidings by 2030 on the core corridors in Austria.

ERTMS will be implemented on the AWB RFC in Austria according to the National Deployment Plan:

- Attang Pucheim – Salzburg: ETCS L1 in operation already 2019
- Linz – Wels – Attnang-Puchheim: ETCS L2 à 2022
- Spielfed-Straß – Graz: ETCS L2 à 2030
- Graz - Bruck a.d. Mur: ETCS L2 à 2030
- Bruck a.d. Mur - St. Michael: ETCS L2 à 2030
- St. Michael – Selzthal: ETCS L2 à 2030
- Traun – Linz: ETCS L2 à 2030
- Traun – Marchtrenk: ETCS L2 à 2030
- Selzthal – Traun: >2030
- Rosenbach – Villach: >2030
- Villach – Spittal-Milstättersee: >2030
- Spittal-Milstättersee – Schwarzach-St. Veit: >2030
- Schwarzach-St. Veit – Bischofshofen: >2030
- Bischofshofen – Salzburg: >2030

All lines of the AWB RFC in Austria fulfill the criteria of 1435mm track gauge already in 2019.

ÖBB will implement the following larger projects on the AWB RFC before 2030:

- Line: Bischofshofen – Salzburg: Golling-Abtenau - Sulzau; Improvement of alignment and speed increase; by 2022
- Line: Graz - Bruck a.d. Mur: Station reconfigurations Bruck a.d.M - Graz (Mixnitz-Bärenschützklamm, Frohnleiten, Peggau-Deutschfeistritz, Gratwein-Gratkorn) incl. 740m sidings for capacity improvement; new 740m sidings; by 2027

- Line: Spielfeld-Straß – Graz: Graz – Weitendorf; 4. Track upgrade; Connection to Terminal and Airport link; Connection Koralm line for capacity improvement (4 track upgrade), Terminal connection; by 2025

ÖBB together with the Ministry of transport did comprehensive traffic forecasts (passenger and freight traffic) and timetable/capacity calculations. With the prerequisite of implementing the above mentioned projects, there will be no capacity bottlenecks on the lines of AWB RFC in Austria before 2030 (>100% according to UIC method).

SLOVENIA

Lack of capacity in lines

The rising volume of traffic, with simultaneously increasing demands in terms of quality and quantity, requires a unique, harmonized and generally-valid understanding to be developed as regards available railway-infrastructure capacity.

According to UIC Leaflet 406 single-track is considered as 100% utilized if the percentage of capacity utilization approaches to 85%. For double tracks with mixed traffic is this percentage 75%.

Slovenia has on AWB RFC capacity problems on the line section Kranj – Jesenice. Utilized capacity of trains in 24 hours is 76 -100 trains while occupancy rate is 92%. Since a percentage of occupancy is high it is necessary to approach to increase the permeability of capacity.

In some stations cross Slovenian part of AWB RFC, there will be also possible insufficient capacity in a long term perspective, because of short station tracks.

Axle loads and train weight limits

Category D3 (Load per unit length 7,2 t/m and axle load 22,5 t) is considered as normal category for the Slovenia's rail lines for international transit traffic.

Now Slovenia has restrictions on line sections Zidani Most – Rimske Toplice and Maribor – Pesnica where on some sections exist C3 axle load (load per unit length 7,2 t/m and axle load 20,0 t) – on both sections projects of upgrading this parameters are ongoing and are expected to be completed in 2020.

The goal targeted by development projects is to ensure the axle load D4 (8,0 t/m and 22,5 t) on entire AWB RFC sections in Slovenia.

Train length

Maximum permitted length of freight trains in Slovenia is 740 meters (with traction included). On particular lines permitted length is extra restricted because of short station tracks.

We now have restrictions on the following lines:

- Dobova border – Zidani Most - 570 m;
- Zidani Most – Ljubljana - 570 m;
- Ljubljana – Jesenice border - 515 m;
- Zidani Most – Pragersko - 597 m (in 2020 is expected to be completed the ongoing project – then permitted length of freight trains will increase to 740 m);
- Pragersko – Maribor - 597 m (in 2020 is expected to be completed the ongoing project – then permitted length of freight trains will increase to 740 m);
- Maribor – Šentilj border - 560 m (in 2020 is expected to be completed the ongoing project – then permitted length of freight trains will increase to 740 m);

The goal is to increase the train length on all lines of AWB RFC sections in Slovenia to 740 m.

CROATIA

On the rail network of Croatia on the AWB RFC, at this moment the bottleneck is the section line Dugo Selo - Novska and station Dugo Selo and to a less extent station Sesvete.

The line section Dugo Selo - Novska is a single-track line with a speed of 60 km/h (2/3 of section line) and 80 km/h (1/3 of section line) and with a number of stations with low track capacity in terms of track number and length. Due to such infrastructure capacities, the capacity of trains is 79 trains per day, and according to the timetable it is 86, which represents a capacity utilization of 108.86%.

Dugo Selo station primarily, and to a less extent station Sesvete also, represent the bottlenecks, especially in the peak hour of passenger traffic.

Section line Savski Marof - Zagreb Zk, although a double track railway line, has a reduced capacity utilization due to the condition of infrastructure and consequently the lower infrastructural speeds.

SERBIA

On the railway network of Serbia there are two sections representing the bottlenecks:

➢ Batajnica - Surčin on section Batajnica - Beograd Ranžirna (throughput is 43 trains per day) and

- Čiflik - Staničenje on section Niš Ranžirna - Dimitrovgrad (throughput is 46 trains per day)

These two sections have the lowest capacity due to the speed limits and single track traffic.

In the horizon till 2025 during the reconstruction of a part of the line Niš Ranžirna - Dimitrovgrad, some stations will be reconstructed, which will enable the traffic of longer trains. Also, train speed will be increased on this section.

In the horizon till 2023 the whole section Niš Ranžirna - Dimitrovgrad will be electrified.

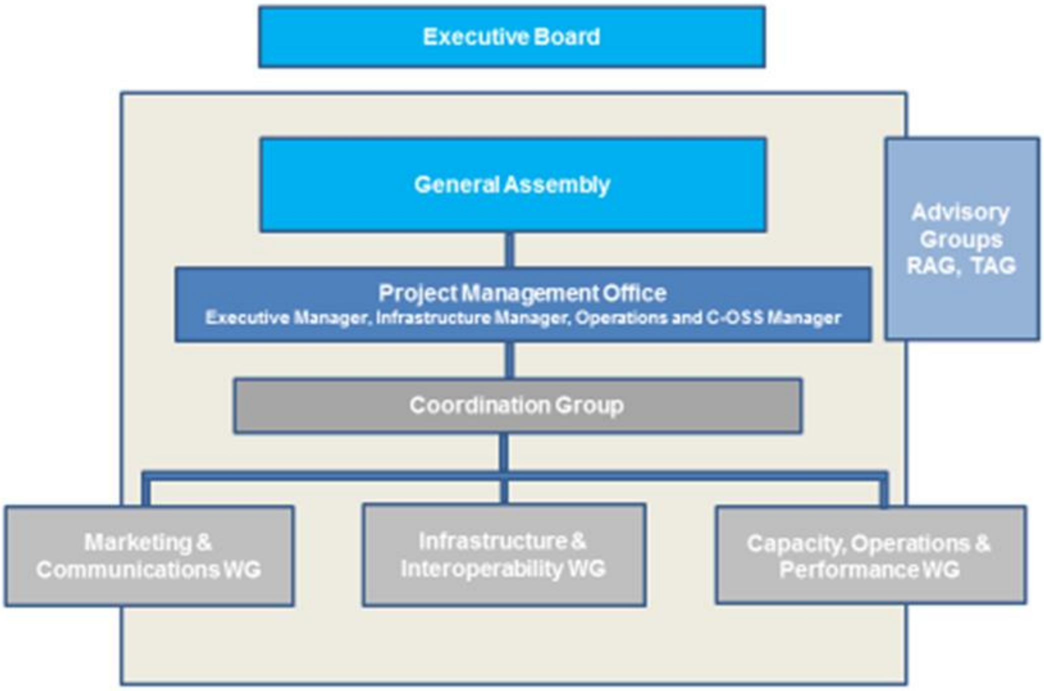
BULGARIA

The removal of the bottlenecks regarding the capacity along the AWB RFC on the territory of Bulgaria is planned as follows:

- Sofia - September - until 2025
- Voluyak - Sofia - until 2025
- Kalotina Zapad - Voluyak - until 2030

An overview of potential benefits in case of bottlenecks removal is given in point 6.1. Capacity Management Plan.

2.4. AWB RFC Governance



The Regulation 913/2010/EU defines two levels in the governance structure:

1. **The Executive Board (ExBo)** which is composed of representatives of the authorities of the Member States concerned responsible for defining the general objectives of the freight corridor, supervising and taking the measures for improvement of the corridor. The participation of each Member State is obligatory.

2. **The Management Board (MB)** which is composed of the Infrastructure Managers (IM) concerned and, where relevant, the Allocation Bodies (AB) responsible for taking all operative measures for the implementation of the corridor. The participation of each IM and AB is obligatory.

The MB takes its decisions, including decisions regarding its legal status, the establishment of its organisational structure, resources and staffing, on the basis of mutual consent of the infrastructure managers concerned. The MB may be an independent legal entity.

The ExBo members are representatives of 5 States: 4 Member EU Member States and one non-EU Member State.

The MB members are representatives of 5 railway infrastructure managers in the countries concerned.

The MB of AWB RFC was established by the signature of a Memorandum of Understanding among all the parties, in June 2018.

Composition of the 1st AWB RFC Management Board

Member	***Country***	***Representative***	***Deputy***
ÖBB-Infrastruktur AG	Austria	Harald Hotz	Helga Steinberger
SŽ – Infrastruktura, d.o.o.	Slovenia	Matjaž Kranjc	
HŽ INFRASTRUKTURA d.o.o.	Croatia	Ratko Almer	Biserka Keller
Infrastruktura železnice Srbije a.d.	Serbia	Milan Šegan	Danijela Đurić
Държавно предприятие „Национална компания железопътна инфраструктура"	Bulgaria	Zlatin Krumov	Miko Milanov

The Management Board decided to take the form of an EIG - Economic Interest Grouping and approved the Statute of the future EIG Alpine–Western Balkan RFC (hereafter**: EIG AWB RFC)** on June 27, 2019 in Ljubljana.

As a consequence the role of the Management Board was taken over by the **General Assembly** of EIG AWB RFC (hereafter**: GA**).

Composition of the 1st AWB RFC General Assembly

Member	*Country*	*Representative*	*Deputy*
ÖBB-Infrastruktur AG	Austria	Harald Hotz	Helga Steinberger
SŽ – Infrastruktura, d.o.o.	Slovenia	Franc Klobučar	
HŽ INFRASTRUKTURA d.o.o.	Croatia	Ratko Almer	Nikolina Ostrman
Infrastruktura železnice Srbije a.d.	Serbia	Marko Jeremić	Danijela Đurić
Държавно предприятие „Национална компания железопътна инфраструктура"	Bulgaria	Zlatin Krumov	Miko Milanov

The GA meets regularly, at least twice a year in the seat of the EIG AWB RFC in Ljubljana. The Chairperson of the GA is Harald Hotz (ÖBB-Infrastruktur AG), and his deputy is Miko Milanov (Държавно предприятие „Национална компания железопътна инфраструктура). The Chairperson coordinates the activity of the Managers and ensures that the Statute, Internal Rules of Procedures and the Regulation 913/2010 are respected.

The Internal Rules of Procedures for the functioning of the EIG AWB RFC were also approved by the MB/GA on June 27, 2019 in Ljubljana.

The new EIG AWB RFC is set up in Ljubljana, Slovenia, Zaloška cesta 214B.

The **Project Management Office (**hereafter: **PMO)** as the operational office of EIG AWB RFC is set up in Ljubljana, Slovenia, to support the implementation of the AWB RFC and to ensure the functioning of the EIG.

The internationality of the team is considered as a key requirement to ensure a fair balance of representation among the partners and a corridor-oriented perspective overcoming national views.

The PMO is composed of three managers:

- Executive Manager – Miloš Rovšnik (SŽ-I)
- Infrastructure Manager – Biserka Keller (HŽI)
- Operations and C-OSS Manager – Milan Šegan (IŽS)

The managers of the EIG AWB RFC have been appointed on June 27, 2019 in Ljubljana. The EIG AWB RFC managers are appointed for a three year period which is renewable. The managers are tasked with ensuring that operational and technical tasks incumbent upon the EIG AWB RFC are duly accomplished**,** in accordance with the relevant provisions of the Regulation (EU) 913/2010, with the decisions and guidelines of the GA and with the opinions and decisions of the Executive Board.

At the kick-off meeting of the Advisory Groups, held in Zagreb on April 4, 2019, the two Advisory Groups (hereafter: **AGs**) were established:

- **Railway Undertakings Advisory Group** (hereafter: **RAG**) interested in the use of the Corridor;
- **Terminal Managers and Owners Advisory Group** (hereafter: **TAG**) interested in the use of the Corridor, including, where necessary,the inland waterway ports;

The voice of customers is taken into account via the Terminal Managers and the Railway Undertakings Advisory Groups. Participation to AGs is on a voluntary basis.

The AWB RFC organizes two TAG-RAG meetings per year, which alternatively take place along the Corridor. Also, a Common RAG meeting will take place once a year according to the new procedures defined at Corridor Talk level among RFCs.

All RUs and terminal owners/managers which cannot attend the physical Advisory Groups meetings but are interested in using the AWB RFC can be informed via the website: https://www.rfc-awb.eu or directly at the national contact persons.

One representative for each Advisory Group has been nominated to coordinate the position of the group, as a spokesperson of the group.

The spokesperson of the Railway Undertakings Advisory Group is Mr. Damjan Janez Pangrec from SŽ-Tovorni promet from Slovenia.

The spokesperson of the Terminal Managers and Owners Advisory Group is not nominated yet.

The AGs may issue an opinion on any proposal by the GA, which has direct consequences for them, as well as own-initiative opinions. The GA shall take any of these opinions into account.

To join the Advisory Groups, the PMO has to be contacted or the representatives of the Advisory Groups.

In order to facilitate communication with the operators a national contact point is made available for each country concerned by the Corridor, in charge of collecting the interests of participation at national level:

Country	***IM***	***Contact person***	***Contact information***
Austria	ÖBB-Infrastruktur AG	Helga Steinberger	e-mail: helga.steinberger@oebb.at mob: +43 664 6176644
Slovenia	SŽ – Infrastruktura d.o.o.	Miran Pirnar	e-mail: miran.pirnar@slo-zeleznice.si phone: + 386 129 12 317
Croatia	HŽ INFRASTRUKTURA d.o.o.	Nikolina Ostrman	e-mail: nikolina.ostrman@hzinfra.hr phone: +385 1 453 4303
Serbia	Infrastruktura železnice Srbije a.d.	Maja Stanojević	e-mail: maja.stanojevic@srbrail.rs mob: +381 64 810 69 70
Bulgaria	Държавно предприятие „Национална компания железопътна инфраструктура"	Apostol Hristov	e-mail: a_hristov@rail-infra.bg phone:+359 889 255 308

For consultation of applicants likely to use the corridor the first draft of the Implementation Plan was submitted to the Advisory Groups members of the AWB RFC in September 2019 via the e-mails. AWB RFC did not receive any remarks from the TAG/RAG members to the draft Implementation Plan within the given deadline.

The **Corridor One-Stop Shop (**hereafter: **C-OSS)** is set up as a joint body for applicants to request and to receive answers, in a single place and in a single operation, regarding allocation of infrastructure capacity for freight trains crossing at least one border along the corridor.

Coordination Group (CG)

- The Coordination Group is led by the Executive Manager. The Coordination Group's objective is to clarify and harmonize positions of the Members and providing support in any issue that is not already in the scope of other working groups.
- The members have a coordinating function for a smooth decision making process;
- The Coordination Group consists of representatives of the Members and the Executive Manager. Each Member of the EIG appoints one representative;
- Having a sound knowledge of the processes, expectations and internal vision of their company on the corridor business and on the general European environment, the main

responsibility of the Coordination Group is to advise and support the PMO in preparing the decisions to be submitted to the GA in a way that can facilitate its decision process;

- At the same time the Coordination Group members are expected to pro-actively support the corridor development;
- Tasks of Coordination Group are:
  - formulate a first level Members' position whenever the necessity arises to elaborate a corridor position;
  - conduct a first level negotiation to reach a viable solution whenever diverging positions are expressed;
  - support the Member representatives in the WGs whenever necessary, e.g. by facilitating the timely delivery of information/quality performance of tasks requested by WG leaders;
  - support the PMO in the communication issues, such as RAG/TAG meeting;
  - cooperate with PMO by preparation of documents of general nature, which are not in the scope of the other WGs;
  - support the GA in their decision on organization, working groups and all other activities;
  - coordinate the activities between the working groups;
  - prepare the documents for the GA;
  - prepare the decisions of the GA;
  - act as a contact point between IMs and Corridor Structures;
  - propose the agenda and location of the Advisory Group meetings (TAG,RAG);
  - relation to other groups: coordinates works of all working groups;
  - Coordination Group members agree with the Executive Manager an activity plan for their work that may include regular meetings;

Coordination Group Members	
ÖBB-I	Helga Steinberger
SŽ-I	Miran Pirnar
HŽI	Nikolina Ostrman
IŽS	Maja Stanojević
NRIC	Apostol Hristov

Working Groups

The working groups were set up in 2018. Their tasks are described in the Internal Rules of Procedures of the EIG AWB RFC. These working groups are composed of experts appointed by the Members of the EIG. The groups are coordinated by the PMO. The groups assist to the PMO and to the Coordination Group in their work.

The Working Groups are no decision making bodies of the corridor organization. Theirs tasks and responsibilities are as follows:

- organize their meeting and internal work in a structured, repeatable and professional way in cooperation with the responsible Manager of the PMO;
- take into account, whenever appropriate and possible, RNE guidelines and suggestions, especially when strong inter-corridor cooperation is needed;
- deliver all needed data/information to implement the requirements of the Regulation;
- initiate and develop proposals for alternative solutions describing pros and cons in a quantitative way so that the GA can decide about the solution that most matches the corridor vision and the existing constrains;
- each member of the working group is expected to represent the position of her/his company, but at the same time they are also expected to have a corridor feeling and to be open to innovation and smart solutions;

Working Group Leaders

- Each WG is led by a responsible Manager or a WG Leader;
- A WG Leader is appointed by the members of the concerned working group by simple majority. GA and CG will be informed about the appointment;
- In case no agreement can be reached the responsible Manager will take over the role;
- The WG Leader works in close contact with the responsible Manager of the PMO as indicated in the previous paragraphs;
- The WG Leader has the responsibility of:
  - coordinating the work of the WG according to the rules and expectation of the GA;
  - ensuring the completion of planned delivery or proposing alternative solutions;
  - ensuring that the Members of the WG are well informed about the corridor vision of the GA;
  - ensuring a proactive and creative approach to the topics in the scope of the WG;
  - ensuring the transparency of the work and the handling of possible interconnections with the works developed in other WGs;
  - ensuring the systematic feedback to the PMO and GA;
- The WG Leader tasks are as follows:
  - drafts/reviews the mandate of the WG together with the reference Manager and the WG Members;
  - prepares and shares with WG Members and the reference Manager the work plan on annual basis;
  - plans and conducts the meetings;
  - prepares and sends out agendas at least two weeks before the meeting and the minutes not later than two weeks after the meeting;
  - initiates activities that are in the scope of the WG and are significant for a) the fulfillment of the Regulation, b) the further development of the corridor;
  - participates in meetings with the other WG Leaders or CG when requested;
  - reports to the reference Manager, the CG and the GA on the progress of the WG;
  - coordinates the work of the WG;

Currently existing working groups are:

Marketing & Communications Working Group

- support carrying out and periodically updating a Transport Market Study of AWB RFC, preparing part of the Implementation Plan as a result from Transport Market Study;
- support carrying out the Capacity Study;
- introduce consultation mechanisms with a view to the proper participation of the applicants likely to use AWB RFC;

- draw up the procedures to ensure optimal coordination between the operation of the railway infrastructure and the terminals;
- cooperate with regional/local administration;
- carry out the satisfaction surveys;
- cooperate to the drafting the Corridor Information Document – CID;

Capacity, Operations & Performance Working Group

- evaluate the need for capacity to be allocated to freight trains running on AWB RFC taking into account the transport market study;
- draw up the procedures to ensure optimal coordination of the allocation of capacity between infrastructure managers, this shall also take into account access to terminals;
- promote coordination of priority rules relating to capacity allocation;
- participate in drafting the CID Book 4: Procedures for Capacity and Traffic Management;
- participate in creating the PaPs and RC;
- participate in proposal of the corridor objectives;
- monitor the coordination of works along the corridor according to the traffic disruptions (TCR);
- participate in drafting the Implementation Plan;
- monitor the performance of rail freight services on the AWB RFC and prepare publishing the results of this monitoring once a year;
- promote compatibility between the performance schemes along the corridor;
- put in place procedures for coordinating traffic management along the corridor;
- adopt common guidelines, also for traffic management in the event of disturbance to train movements on corridor;

Infrastructure & Interoperability Working Group

- participating in drawing up and reviewing the CID Book 1- Book 5;
- participating in drawing up the deployment plan for ERTMS on the corridor;
- participating in drawing up and periodically reviewing the Investment Plan, which includes details of indicative medium and long-term investments for infrastructure on the corridor;
- participate in the coordination and planning of works along the corridor aiming to minimize traffic disruptions (TCR);

According to the future needs, the above-mentioned working groups may be modified or substituted by others. New working groups may also be set up when needed in order to deal with further issues that may arise.

3. Market Analysis Study [6]

3.1. Introduction

An efficient transport system is essential for the development of a country and of a region as it helps reduce travel time and production costs and improves competitiveness. It also improves access to markets and is a key aspect in preserving investors' interest in a region. Current global and European economic developments are driving an increase in demand for transport services.

Rail freight transport is an important part of the transport market and it is an important factor in sustainable development. Rail freight is considered to be the most environmentally friendly mode of transport for goods, and plays an important role in the freight transport market. It thus contributes to the development of human society and enables economic and social progress while respecting the environment. Due to factors both exogenous (e.g. competition in road and air transport, technological innovations oriented to other modes of transport, changes in transport requirements) and endogenous (e.g. inefficiency, overemployment, low level of innovation and modernisation, technological lags), rail freight lost competitiveness in the transport services market, resulting in a decrease in the transport performances of the rail sector. At the same time, a shift in transport performances to other more environmentally demanding modes of transport occurred. This has led to higher production of the negative external costs of transport, and a need for higher state subsidies to the related transport infrastructure from public funds. This unfavourable condition has to be addressed by individual states and the EU as a whole.

Increasing requirements with regard to the quality and availability of rail freight services in Europe had led to the intention to establish the new European rail freight corridor – the AWB RFC, which connects four EU member states (Austria, Slovenia, Croatia, Bulgaria) and fully integrates the EU candidate state Serbia. The corridor connects Central Europe and South-East Europe, and also brings improvements to railway transport in the Central Europe-Turkey direction (and beyond). AWB RFC provides a natural link and shortest route from Central Europe to the Bulgarian/Turkish border for rail freight.

[6] The following chapters have been extracted from the AWB RFC Transport Market Study

3.2. Objective of Transport Market Study

The main objective of Transport Market Study (hereinafter: TMS) is to provide a clear understanding of the current conditions of the freight market along the AWB RFC together with short- and long-term freight traffic forecasts, and also to propose a measurement of the expected modal shift from road to rail. Based on the results of the transport market study, it will be possible evaluate the current state, perspective, prognosis and opportunities of the new corridor.

In order to achieve the main objectives of the TMS of the AWB RFC, this publication has the following structure:

1. Introduction
2. Objective of Transport Market Study
3. Methodology of TMS preparation
4. AWB RFC description
5. Analysis of socio-economic indicators
6. Analysis of transport and traffic indicators
7. Analysis of AWB RFC railway infrastructure
8. Development of rail freight traffic and major trade flows along the AWB RFC
9. Possibilities to shift cargo from road to rail
10. Prognosis of transport performance development
11. Connections with other RFCs and rail networks
12. Future investments in the AWB RFC
13. Further recommendations for AWB RFC
14. Conclusions

3.3. Methodology of TMS preparation

The statistical and analytical data required for elaborating the individual parts of the TMS of the AWB RFC, with which it was possible to elaborate the individual parts of the study and then to propose the optimal strategy, are shown in the table below.

Table 3.3-1: Statistical and analytical indicators monitored in the TMS

Scope	Indicator
Technical parameters	Maximum length of train, allowed axle load on lines, maximum train load, signalling equipment, electrification system, loading gauge, average speed of train, speed limits, maximum gradient on lines, profile

Transport performances	Development of transport performances on corridor lines (national transport and international transport)
General indicators	Population, industry (the most important industrial areas in countries of the AWB RFC), transport infrastructure, imports and exports
Macroeconomic / microeconomic indicators	GDP development and prognosis in the EU and AWB RFC member states, GDP per capita in purchasing power parity, human development index, index of competitiveness of economies, index of economic freedom, transit times for railway transport on cross border sections
Modal split	Development of modal split between individual modes of transport (freight and passenger transport on national territories)
Capacity analysis	Development of transport capacity utilisation 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

3.3.1. Baselines for the TMS elaboration

The elaboration of TMS required the analysis and processing of various technical, capacity and economic indicators from a wide range of sources. More specifically, in the process of elaborating the TMS of the AWB RFC the following sources of information were used:

- EU and national legislation of the AWB RFC member states,
- Annual reports from the infrastructure managers and allocation bodies of AWB RFC member states,
- Network statements from the infrastructure managers and allocation bodies of AWB RFC member states,
- Traffic and transport performances provided by corridor infrastructure managers, traffic and transport performances from statistical offices of AWB RFC member states,
- Data from Eurostat,
- Data from the International Monetary Fund,
- Data from the Organisation for Economic Cooperation and Development, data from the World Bank,
- Economic indicators provided by the statistical offices of AWB RFC member states,
- Reports and studies on 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), scientific literature.

3.3.2. Method used in TMS elaboration

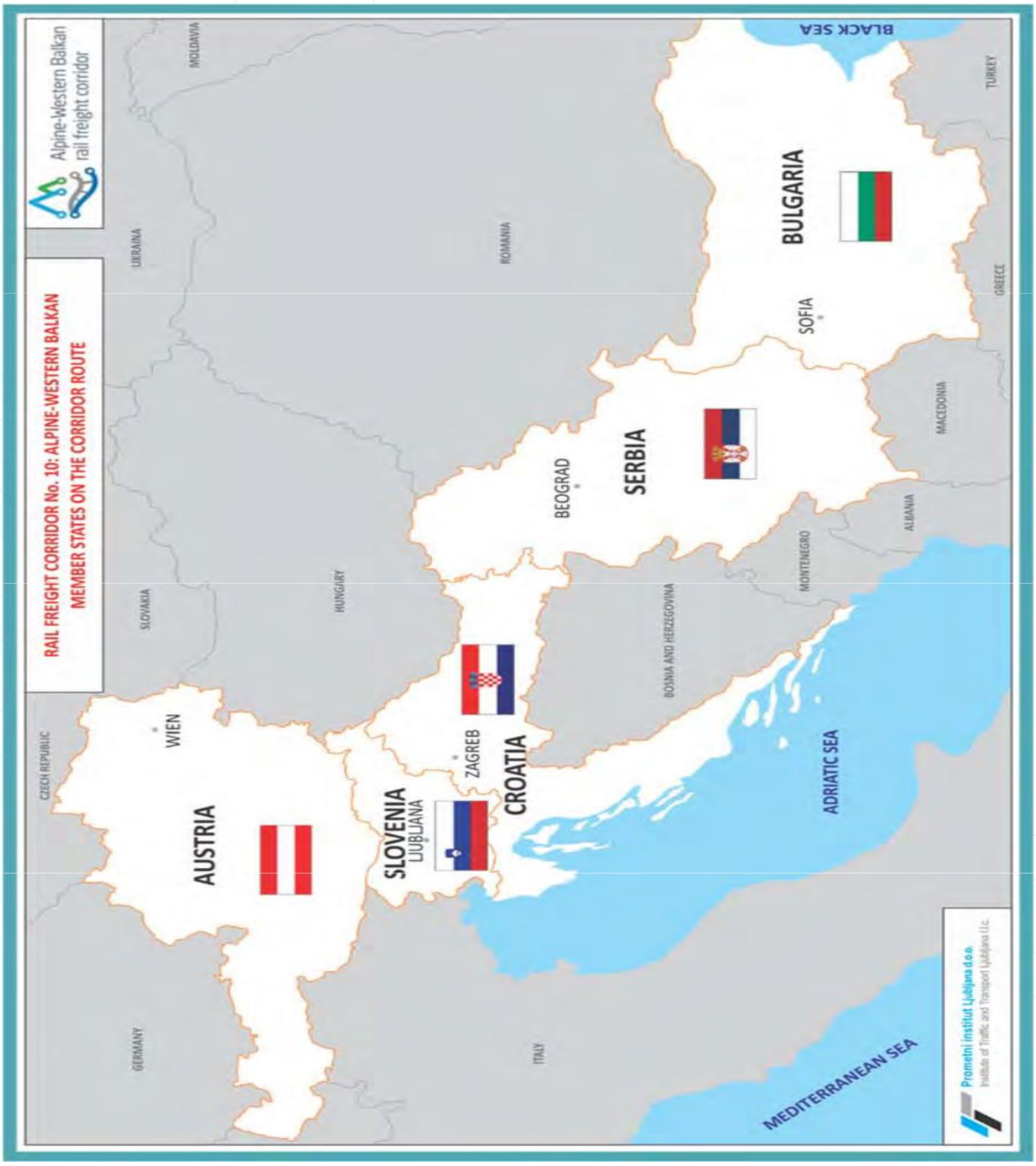
The individual results of the TMS of the AWB RFC were worked out using the following methods:

- 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 the required transport and technical statistical data,
- Method of graphic representation – used for graphic and visual layout of the acquired and processed statistical data and other results of the study,
- Method of comparative analysis – comparison in the analytical part,
- Method of synthesis – for summarising the information and data obtained,
- Method of induction and deduction – used in all parts of the TMS, in creating logical judgments based on theoretical, legislative and empirical knowledge,
- Brainstorming – consultations with practitioners,
- Methods of statistical analysis – used in searching and processing the required transport, technical and economical statistical data,
- Prognostic method – used in development of TMS prognostic scenarios.

3.3.3. Analysis of socio-economic indicators

The chapter that follows is focused on an analysis of selected socio-economic indicators that that have an impact on the growth of transport services.

Figure 3.3.3.-1: Member states of the AWB RFC



3.3.4. Basic characteristics of the countries of the AWB RFC

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

Country	Republic of Austria 	Republic of Slovenia 	Republic of Croatia 	Republic of Serbia 	Republic of Bulgaria 
Capital	Vienna	Ljubljana	Zagreb	Belgrade	Sofia
Area	83.879 km^2	20.273 km^2	56.594 km^2	88.361 km^2	110.993 km^2
Population	8,751,000	2,081,000	4,284,889	8,762,000	7,000,039
Density	105 / km^2	103 / km^2	76 / km^2	100 / km^2	63 / km^2
Official language	German	Slovene	Croatian	Serbian	Bulgarian
Administrative divisions	9 states	12 statistical regions (no administrative function)	20 counties and the City of Zagreb	Unitary state, composed of 145 municipalities, 29 districts and 2 autonomous provinces	27 districts and metropolitan capital province Sofia

Neighbouring countries	Italian Republic, Principality of Liechtenstein, Swiss Confederation, Federal Republic of Germany, Czech Republic, Slovak Republic, Hungary, Republic of Slovenia	Italian Republic, Republic of Austria, Hungary, Republic of Croatia	Republic of Slovenia, Hungary, Republic of Serbia, Bosnia and Herzegovina, Montenegro	Hungary, Romania, Republic of Bulgaria, Republic of North Macedonia, Republic of Albania, Montenegro, Bosnia and Herzegovina, Republic of Croatia	Republic of Serbia, Romania, Republic of North Macedonia, Greece, Republic of Turkey
Geographical location	Central Europe	Central Europe	South-eastern Europe	South-eastern Europe	South-eastern Europe

3.3.5. Economic Indicators

Within the economic indicators, the indicators GDP current prices, GDP current prices in purchasing power parity, GDP growth rate, GDP per capita in purchasing power standard, GDP share and HDI, GCI, IEF and ETI indices for the individual countries of the AWB RFC are analysed in the following sections.

3.3.5.1. Gross Domestic Product (GDP)

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 for the individual countries included in the AWB RFC.

In 2017, the GDP of the selected countries amounted to 550.3 billion EUR at current prices.

Table 3.3.5.1-1: GDP, current prices, million EUR

	2013	2014	2015	2016	2017	2018
EU (28 countries)	13.596.777,90	14.072.020,70	14.828.642,40	14.958.293,00	15.382.590,60	15.887.040,20
Alpine - Western Balkan RFC area (5 countries)	482.213,40	492.472,30	508.731,70	528.085,90	552.734,70	581.471,60
Austria	323.910,20	333.146,10	344.258,50	356.237,60	369.899,20	386.093,80
Slovenia	36.239,20	37.603,30	38.863,30	40.357,20	42.999,70	45.947,60
Croatia	43.779,20	43.431,00	44.605,90	46.639,50	48.989,50	51.467,80
Serbia	36.426,70	35.467,50	35.715,50	36.723,00	39.183,30	42.780,20
Bulgaria	41.858,10	42.824,40	45.288,50	48.128,60	51.663,00	55.182,20

Source: Eurostat

Expressing GDP in PPP (purchasing power parity) eliminates differences in price levels between countries, and calculations on a per head basis allows for the comparison of economies significantly different in absolute size.

Table 3.3.5.1-2: GDP, current prices, million EUR purchasing power parity

	2013	2014	2015	2016	2017
EU (28 countries)	13.596.773,80	14.071.985,20	14.826.929,20	14.953.489,70	15.382.590,60
Alpine - Western Balkan RFC area (5 countries)	577.228,60	593.705,70	623.278,20	633.969,80	650.135,20
Austria	298.529,20	307.426,70	323.901,30	328.329,60	334.683,70
Slovenia	45.091,00	46.882,00	49.065,90	49.854,30	52.748,60
Croatia	68.175,80	68.974,30	72.670,80	74.478,90	76.578,50
Serbia	76.991,50	77.052,80	79.554,10	80.185,30	81.464,40
Bulgaria	88.441,10	93.369,90	98.086,10	101.121,70	104.660,00

Source: Eurostat

The following table shows the GDP growth rate in % for the individual countries included in the AWB RFC, including that forecast for 2019 – 2020.

Table 3.3.5.1-3: Real GDP growth rate and prognosis in %

	Real GDP growth rate (%)						Prognosis of GDP (%)	
	2013	2014	2015	2016	2017	2018	2019	2020
EU (28 countries)	0,3	1,9	2,4	2,1	2,7	2,1	1,6	1,7
Austria	0,0	0,8	1,1	2,0	2,6	2,7	2,0	1,7
Slovenia	-1,1	3,0	2,3	3,1	4,9	4,5	3,4	2,8
Croatia	-0,5	-0,1	2,4	3,5	2,9	2,7	2,6	2,5
Serbia	2,9	-1,6	1,8	3,3	2,0	4,4	3,5	4,0
Bulgaria	0,5	1,8	3,5	3,9	3,8	3,2	3,3	3,0

Source: International Monetary Fund

From the above-mentioned analysis of GDP growth rates, we can confirm the slowdown in economic growth in 2013 in all the analysed countries, except in Serbia. However, a return to

GDP growth has been recorded since 2015. The GDP growth rate forecasts predict a positive growth trend above 2 % in 2018, as well as in 2019 and 2020, for all the monitored countries.

The following table 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 2013 – 2017. 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 3.3.5.1-4: GDP per capita in purchasing power parity

	2013	2014	2015	2016	2017
EU (28 countries)	100	100	100	100	100
Austria	131	130	130	127	128
Slovenia	82	82	82	83	85
Croatia	60	59	59	60	61
Serbia	38	37	36	37	37
Bulgaria	46	47	47	49	49

Source: Eurostat.

The highest index of GDP per capita in PPP among member states of the AWB RFC in 2017 was in Austria, at 128. However, there was a slight decline in the period 2013 – 2016 in Austria. GDP per capita in PPP in Slovenia, Croatia and Bulgaria has been stable since 2013, with a slight increase. In Serbia, there was a slight decline in the period 2013 – 2017. The steady trend of GDP per capita in purchasing power parity terms confirms there has been relative price stability in the analysed countries.

The next table analyses the share of GDP within primary, secondary and tertiary spheres of the national economy for the period 2013 – 2017 for the countries of the AWB RFC.

Table 3.3.5.1-5: Analysis of GDP share

Country	Item / Year	2013	2014	2015	2016	2017
Austria	Agriculture, value added (% of GDP)	1,3	1,2	1,1	1,1	1,1
	Industry, value added (% of GDP)	25,5	25,4	25,0	24,7	25,3
	Services, etc., value added (% of GDP)	73,2	73,4	73,9	74,2	73,6
Slovenia	Agriculture, value added (% of GDP)	1,8	2,0	2,0	1,9	1,8
	Industry, value added (% of GDP)	27,6	28,4	28,2	28,0	28,8
	Services, etc., value added (% of GDP)	70,6	69,6	69,8	70,1	69,4
Croatia	Agriculture, value added (% of GDP)	3,7	3,5	3,5	3,4	3,3
	Industry, value added (% of GDP)	22,5	22,5	22,3	22,1	21,8
	Services, etc., value added (% of GDP)	73,8	74,0	74,1	74,4	75,0
Serbia	Agriculture, value added (% of GDP)	7,9	7,7	6,8	6,5	6,0
	Industry, value added (% of GDP)	26,7	25,2	26,0	25,8	26,4
	Services, etc., value added (% of GDP)	65,5	67,1	67,3	67,7	67,6
Bulgaria	Agriculture, value added (% of GDP)	4,6	4,6	4,1	4,1	3,7
	Industry, value added (% of GDP)	23,8	23,6	24,1	24,4	24,5
	Services, etc., value added (% of GDP)	71,7	71,9	71,8	71,5	71,7

Source: World Bank.

On the basis of the data analysed in Table 3.3.5.1-5, 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 development of these countries and their potential for sustainable development, as the tertiary sphere of the national economy is less harmful to the environment.

3.3.5.2. Index of Economic Freedom (IEF), the Global Competitiveness Index (GCI) and Human Development Index (HDI)

The IEF index belongs to indicators aimed at measuring 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 analyses indicators in the areas of the impact of state interventions in the economy, the protection of property rights, and the interventions in terms of 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 economic performance, higher GDP growth rates and higher GDP per capita compared to countries with a low level of economic freedom. The measure was created by the Heritage Foundation, and covers 180 countries with scores from 0 to 100, with 100 being the highest value of the economic freedom index.

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

The Human Development Index (HDI) index is currently used most often to compare the level of human development, and is considered to be the most comprehensive indicator of quality of life. The HDI 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 and ranges from 0 to 1, with a higher value indicating a higher quality of life.

The following table analyses the IEF, GCI, HDI indicators separately for each country of the AWB RFC.

Table 3.3.5.2-1: Overview of analysed indexes for the countries of the AWB RFC

Index (Year)	IEF (2018)		GCI (2017 - 2018)		HDI (2018)	
Country	Score	Rank/180	Score	Rank/137	Score	Rank/188
Austria	71,3	32	5,25	18	0,909	20
Slovenia	64,8	64	4,48	48	0,896	25
Croatia	61,0	92	4,19	74	0,831	46
Serbia	62,5	80	4,14	78	0,787	67
Bulgaria	68,3	47	4,46	49	0,813	51

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

By looking at the values for the Economic Freedom Index, Global Competitiveness Index and Human Development Index, it can be seen that Austria achieved the best ratings among the analysed countries. Austria ranks in 32nd place globally with regard to the Economic Freedom Index, 18th place for the Global Competitiveness Index and 20th for the Human Development Index. Overall, based on the data in Table 3.3.5.2-1 it is possible to confirm appropriate macro environments in all the analysed countries for the investment, business and innovations that contribute to economic development and the subsequent demand for transport services. The results also confirm the competitiveness of the economies of these countries in relation to other nations around the world.

3.3.5.3. Enabling Trade Index (ETI)

The Enabling Trade Index (ETI) index is created by the World Economic Forum in cooperation with the World Bank and various national institutions which ensure the availability of the necessary data. The index is made up of four sub-indexes assessing the following:

- 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 a given range. There are 136 countries in the ranking, with scores closer to 7 being better, and the best country being ranked at #1.

Table 3.3.5.3-1: Overview of ETI index and individual sub-indexes for AWB RFC countries

Country	Rank/136 (2016)	Score	Suindex scores			
			Market Access	Border Administration	Transport and communications Infrastructure	Business Environment
Austria	7	5,5	4,9	6,3	5,5	5,4
Slovenia	32	5,0	5,0	5,8	4,6	4,5
Croatia	44	4,8	5,0	5,4	4,4	4,2
Serbia	64	4,4	4,9	4,7	4,0	4,0
Bulgaria	53	4,5	4,8	5,0	4,1	4,2

Source: World Economic Forum, World Bank.

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 the sub-index in the area of transport and communications infrastructure has also been demonstrated. Appropriate measures by the EU and individual member states in the field of transport infrastructure, as well as by transport infrastructure managers, will again be reflected in the rankings of the analysed countries, whereby the overall value of the ETI index will be increased with better measures.

3.3.6. Review of AWB RFC state markets

The transport services market is different in the analysed countries, with these differences mainly influenced by the geographical location, the deployment of industrial and logistics centres, as well as the main sectors of their economies. This subchapter provides information about the various industries in the in AWB RFC member countries (Austria, Slovenia, Croatia, Serbia, and Bulgaria).

3.3.6.1. Austria

Austria is a developed and highly industrialized country, economically tied to other EU members, especially Germany. The Austrian economy is characterised by an extensive service sector, a strong industrial sector and a small but highly developed agricultural sector.

The industrial sector in Austria is diverse, with many traditional forms of industry. The main industrial sectors are construction, mechanical engineering, automobile and automotive parts production, food processing, chemical processing, and the wood and textile industries. Industrial facilities are located near the raw materials needed for production. The textile industry is concentrated in the east of the country, where the glass and chemical industries and the production of electrical and electronic products are located. The heavy industry is located in the area of Vienna, Linz, Leoben and other river corridors. The Renewable Energy Sources (RES) sector, especially hydroelectric power plants, is booming and has already exceeded the efficiency of the tourism and construction sector.

The Austrian industrial sector accounts for 25 % of GDP and employs just over a quarter of the working population. The growth of industrial production in the year 2017 was 3,9 %. In the next two years analysts predict moderate growth in industrial production, at 2,4 % in 2019 and 1,5 % in 2020.

The annual value of the Austrian tourism industry is expected to reach EUR 36,5 billion in 2022, while the total annual growth rate is projected to be 2,2 % in the period 2018 – 2022.

Food services are the largest segment of the tourism industry in Austria, and account for 37,9 % of the total value of the industry. The segment of hotels and motels accounts for 22 % of the value of the industry.

In 2017, the value of exports of goods amounted to 138,7 billion EUR, while the value of imports amounted to 139,9 billion EUR. The trade deficit in trade in goods amounted to 1,2 billion EUR. Austria exported most of its exports to Germany (in 2017, 29 % of total exports), followed by Italy, the USA, Switzerland and Slovakia. Most of these exports were of machinery, electrical and electronic equipment, vehicles and pharmaceuticals. Austria imported most from Germany in 2017 (41,3 % of total imports), followed by Italy, Switzerland, the Czech Republic and the Netherlands. In 2017, most imports were of machinery, electrical and electronic equipment, vehicles, mineral fuels and plastic products.

Table 3.3.6.1-1: Main import and export groups

The main import groups of goods in 2017	% of the total	The main export groups of goods in 2017	% of the total
Machinery	13,0	Machinery	17,7
Electrical and electronic equipment	11,6	Electrical and electronic equipment	12,4
Vehicles	11,3	Vehicles	9,3
Mineral fuels, oil	6,9	Pharmaceutical products	5,4
Plastics and plastic products	4,3	Plastics and plastic products	4,6

Source: www.izvoznookno.si, https://globaledge.msu.edu

Table 3.3.6.1-2: Leading import and export markets

Leading import markets in 2017	% of the total	Leading export markets in 2017	% of the total
Germany	41,3	Germany	29,0
Italy	5,7	Italy	6,1
Switzerland	5,5	USA	6,1
Czech Republic	4,4	Switzerland	5,1
Netherland	4,1	Slovakia	4,8

Source: www.izvoznookno.si, https://globaledge.msu.edu

The following table shows the list of major business entities in Austria which are potential railway users (i.e., due to freight transport by rail).

Table 3.3.6.1-3: Major business entities in Austria which are potential railway users

FOSSIL FUELS ENERGY	AUTOMOTIVE INDUSTRY	COPPER MINING	WOOD INDUSTRY
Donaustadt 1, 2 ,3 Gas Power Plant	BMW Motoren - Steyr Car Engine Plant	Montanwerke - Brixlegg Copper Refinery	Binder - Fügen Sawmill
Dürnrohr Coal Power Plant	Delphi Packard - Großpetersdorf Auto Component Plant	**GRAIN INDUSTRY**	Binder - Jenbach Wood Processing Plant
Inzersdorf Gas Power Plant	Eybl - Gmünd Auto Component Plant ,Krems Auto Component Plant	Agrana - Aschach Starch Plant	Binder - Sankt Georgen bei Salzburg Plywood Mill
Kagran Gas Power Plant	Faurecia - Kennelbach Auto Component Plant	Agrana - Gmünd Starch Plant	Egger - Döllach Sawmill
Korneuburg Gas Power Plant	Georg Fischer - Altenmarkt Auto Component Plant	**IRON AND STEEL INDUSTRY**	H & H - Stainach Wood Pellet Plant
Leopoldau Gas Power Plant	KTM - Mattighofen Motorcycle Plant	Böhler Edelstahl - Kapfenberg Steel Mill	Haeupl - Vöcklamarkt Sawmill
Linz Süd Gas Power Plant	Liebherr - Korneuburg Train Component Plant	Breitenfeld Edelstahl - Sankt Barbara im Mürztal Steel Mill	Hasslacher - Arnoldstein Sawmill
Mellach Coal, Gas Power Plant	Magna Steyr - Albersdorf, Graz, Sinabelkirchen, Weiz	Voestalpine - Bruck an der Mur Wire Drawing Mill	Hasslacher - Liebenfels Sawmill
Riedersbach I,II Coal Power Plant	Man - Steyr Truck Assembly Plant	Voestalpine - Leoben Steel Mill	Hasslacher - Preding Sawmill
Salzburg Mitte, Nord Gas Power Plant	Opel - Wien Car Engine Plant	Voestalpine - Linz Integrated Steel Mill	Hasslacher - Sachsenburg Sawmill

Simmering Gas Power Plant	Robert Bosch - Hallein Auto Component Plant	**MACHINERY INDUSTRY**	Hot's - Mattighofen Wood Pellet Plant
Theiss Oil Power Plant	Rosenbauer - Leonding Truck Assembly Plant,Neidling Car Assembly Plant	Andritz - Graz Machinery Plant	Hutter - Sankt Martin Sawmill
Timelkam 3,4 Gas Power Plant	Siemens SGP - Graz Train Component Plant , Wien Train Assembly Plant	BRP-Rotax - Gunskirchen Machinery Component Plant	Hutter - Sankt Michael Sawmill
Weitendorf Gas Power Plant	**CEMENT INDUSTRY**	Engel - Dietach Machinery Component Plant	Kirchner - Radstadt Sawmill
Werndorf-Neudorf Oil Power Plant	Holcim - Bludenz, Wien Cement Plant	Engel - Schwertberg Machinery Plant	Lenzing Sawmill (Shutdown)
Zeltweg Coal Power Plant	Kirchdorfer - Kirchdorf Cement Plant	Liebherr - Bischofshofen Loader Assembly Plant	Maresch - Niederfladnitz Sawmill
ALUMINIUM INDUSTRY	Lafarge - Mannersdorf am Leithagebirge, Retznei Cement Plant	Liebherr - Nenzing Machinery Plant	Maresch - Retz Sawmill
AMAG - Ranshofen Aluminium Processing Plant	Leube - Gartenau Cement Plant	Liebherr - Telfs Loader Assembly Plant	Mayr-Melnhof - Frankenmarkt Sawmill
Georg Fischer - Herzogenburg Aluminium Processing Plant	Rohrdorfer - Gmunden, Kufstein Cement Plant	SKF - Steyr Machinery Component Plant	Mayr-Melnhof - Leoben Sawmill
HAI - Ranshofen Aluminium Processing Plant	Schretter - Kirchbichl Cement Grinding Mill	Steyr Traktoren - St. Valentin Tractor Assembly Plant	Neuschmied Sawmill

Nemak - Linz Aluminium Processing Plant	Schretter - Vils Cement Plant	Zumtobel - Donbirn Lightning Plant	Offner - Wolfberg Sawmill
Neuman - Marktl Aluminium Processing Plant	W&P - Leoben Cement Grinding Mill	**OIL REFINING**	Pfeifer - Imst Sawmill
Sapa - Nenzing Aluminium Processing Plant	W&P - Peggau Cement Plant	OMV - Schwechat Oil Refinery	Pfeifer - Kundl Sawmill
Speedline - Schlins Aluminium Processing Plant	W&P - Wietersdorf Cement Plant	**PAPER INDUSTRY**	Rubner - Rohrbach an der Lafnitz Sawmill
Treibacher Schleifmittel - Villach Specialty Alumina Plant	Wopfinger - Wopfing Cement Plant	Mayr Melnhof - Gunskirchen Cardboard Packaging Plant	Rumplmayr - Altmünster Sawmill
Tschirk Wintergarten - Neudörfl Aluminium Processing Plant		Mayr Melnhof - Wien Cardboard Packaging Plant	Rumplmayr - Enns Sawmill
		Mondi - Grünburg Paper Packaging Plant	RZ Holzindustrie - Wiesenau Sawmill (Shutdown)
		Mondi - Hilm Paper Processing Plant	Samonig - Fürnitz Sawmill
		Mondi - Möderbrugg Paper Packaging Plant	Schachl - Abtenau Sawmill
		Mondi - Neusiedler Paper Processing Plant	Stave - Schößwendter Sawmill
		Mondi - Sankt Gertraud Pulp and Paper Mill	Steininger - Rastenfeld Sawmill

		Mondi Bags - Zeltweg Paper Packaging Plant	Stora Enso - Bad Sankt Leonhard Sawmill
		Unterland Flexible Packaging - Langkampfen Paper Processing Plant	Stora Enso - Ybbs Sawmill
			Theurl Holz - Assling Sawmill
			Troger Holz - Vomperbach Sawmill

Source: https://www.industryabout.com/country-territories-3/28-austria

3.3.6.2. Slovenia

Among the most important industries in Slovenia there are the iron industry, automobile manufacturing and manufacturing of electrical devices. Slovenian industry is large share also based on wood and textiles, pharmaceuticals and chemicals, as well as engineering.

The agricultural sector has declined, reaching only 1,8 % of the GDP in 2017 (compared to 4,2 % in 1995). It employs around 3,7 % of the population.

The industrial sector represents about one-third of the GDP (28,8 %) and employment (31,7%). Historically, the dominant industries in Slovenia have been the forestry, textile and metallurgical industries. Since the 1980s, the mechanical industries (automobile, tool machines) and high value-added industries (electronics, pharmaceuticals and chemicals) have developed significantly.

The services sector remains the most significant in the Slovenian economy. This sector, which represented 69,4 % of the GDP and employed 64,6 % of the total workforce in 2017, has shown a strong growth pattern during the last ten years, especially in the fields of information and communications technology (ITC), financial and commercial services and retail business. The tourism sector is also very dynamic and is undergoing a period of strong development.

Slovenia’s main export partners are Germany, Italy, Austria, Croatia and France, while the main exported product groups are road vehicles, medical and pharmaceutical products, electrical machinery and appliances, industrial machinery, metals, and iron and steel. The biggest share of imports are associated with road vehicles, followed by petroleum and petroleum products and electrical machinery, while the majority of products are imported from Germany, Italy and Austria.

Table 3.3.6.2-1: Main import and export groups

The main import groups of goods in 2017	% of the total	The main export groups of goods in 2017	% of the total
Vehicles	11,2	Vehicles	12,8
Petroleum, petroleum products	10,1	Medical & pharmaceutical products	10,3
Electrical machinery, apparatus	6,0	Electrical machinery, apparatus	9,8
General industrial machinery	4,3	General industrial machinery	5,5
Medical & pharmaceutical products	4,3	Manufactures of metals	4,8

Source: www.izvoznookno.si, https://globaledge.msu.edu

Table 3.3.6.2-2: Leading import and export markets

Leading import markets in 2017	% of the total	Leading export markets in 2017	% of the total
Germany	18,3	Germany	20,1
Italy	16,3	Italy	11,9
Austria	11,6	Austria	9,1
Croatia	4,8	Croatia	7,7
France	4,6	France	5,1

Source: www.izvoznookno.si, https://globaledge.msu.edu

The following table shows the list of major business entities in Slovenia which are potential railway users (i.e., could use freight transport by rail).

Table 3.3.6.2-3: Major business entities in Slovenia which are potential railway users

ALUMINIUM INDUSTRY	AUTOMOTIVE INDUSTRY
Talum - Kidricevo Aluminium Smelter	GKN Driveline - Zreče Auto Component Plant
IRON AND STEEL INDUSTRY	Goodyear Dunlop Sava Tires - Kranj Tyre Plant
SIJ - Jesenice Steel Mill	Renault - Novo Mesto Car Assembly Plant
SIJ - Ravne na Koroškem Steel Mill	
WOOD INDUSTRY	**CEMENT INDUSTRY**
LIP Bohinj - Bohinjska Bistrica Sawmill	Salonit - Anhovo Cement Plant
PAPER INDUSTRY	**FOSSIL FUELS ENERGY**
Vipap Videm - Krško Pulp & Paper Mill	Brestanica Gas Power Plant
	Ljubljana Coal Power Plant
	Šoštanj Coal Power Plant
	Trbovlje Coal Power Plant

Source: https://www.industryabout.com/country-territories-3/451-slovenia

3.3.6.3. Croatia

In Croatia the agricultural sector accounts for 3,3 % of GDP and employs about 2 % of the working population. The main agricultural products are wheat, corn, sugar beet, fruits, wine and olive oil.

The service sector contributes 75 % of GDP and employs over 70 % of the working population. Tourism is the most important in the service sector, which is in full bloom. In 2017, Croatia was visited by 18,5 million tourists. It is projected that the sector will be experiencing high growth in the coming years, as the state invests heavily in the development of modern infrastructure.

The Croatian industrial sector accounts for 22 % of GDP and employs 27,6 % of the total working population. Industrial production in Croatia, until the recession, had an important place in total production. The most prominent forms were manufacturing and the petrochemical industry, along with shipbuilding. Some companies were closed down in the process of transition, or were damaged in the war. This mostly applies to the textile, leather, metal and timber industries. There was also significant production in the construction and energy sectors. Some industries, however, still achieve positive results and are active in foreign trade.

According to their total revenues, the leading industrial branches lie the production of food, drinks, tobacco and wood, and these are followed by the chemical and oil industries. More than a third of Croatia's territory is covered by forests, which is why wood industry is one of the basic sectors. Other important sectors are the mechanical and paper industries, building materials industry, shipbuilding and the oil industry.

In 2017, Croatia recorded 1,4 % growth in industrial production. It is projected to increase by 2,8 % and 2% in 2019 and 2020.

The Croatian deficit in trade in goods is in 2017 amounted to 8,1 billion EUR, representing 16,6 % of GDP. In 2017, Croatia exported 11,6 billion EUR and imported 19,8 billion EUR. The most important trading partners of Croatia are Italy and Germany. Italy received 13,4 % of Croatia's exports in 2017, while 12,2% went to Germany. Beside Italy and Germany, other important export markets for Croatia are Slovenia, Bosnia and Herzegovina, and Austria. Croatia imported the most from Germany in 2017 (15,7 % of total imports), followed by Italy, Slovenia, Austria and Hungary. A total of 10,7 % of total imports were imported from Slovenia in 2017. Croatia mostly imports mineral fuels, machinery, electrical and electronic equipment, vehicles and pharmaceuticals. Among its major exports are mineral fuels, machinery, electrical and electronic equipment, vehicles and pharmaceuticals.

Table 3.3.6.3-1: Main import and export groups

The main import groups of goods in 2017	% of the total	The main export groups of goods in 2017	% of the total
Mineral fuels, oil	13,4	Mineral fuels, oil	10,7
Machinery	9,7	Machinery	8,6
Electrical and electronic equipment	7,8	Electrical and electronic equipment	8,5
Vehicles	7,5	Pharmaceutical products	8,0
Pharmaceutical products	4,6	Wood and wood products	5,4

Source: www.izvoznookno.si, https://globaledge.msu.edu

Table 3.3.6.3-2: Leading import and export markets

Leading import markets in 2017	% of the total	Leading export markets in 2017	% of the total
Germany	15,7	Italy	13,4
Italy	12,9	Germany	12,2
Slovenia	10,7	Slovenia	10,6
Austria	7,5	Bosnia and Herzegovina	9,8
Hungary	7,5	Austria	6,2

Source: www.izvoznookno.si, https://globaledge.msu.edu

The following table shows the list of major business entities in Croatia which are potential railway users (i.e., could use freight transport by rail).

Table 3.3.6.3-3 Major business entities in Croatia which are potential railway users

CEMENT INDUSTRY	FOSSIL FUELS ENERGY	OIL REFINING
Calucem - Pula Cement Plant	Jertovec Gas Power Plant	INA - Rijeka Oil Refinery
Cemex - Kaštel Sućurac Cement Plant	Osijek Gas Power Plant	INA - Sisak Oil Refinery
Cemex - Solin Cement Plant	Plomin Coal Power Plant	
Cemex - Solin Majdan Cement Plant	Rijeka Oil Power Plant	
Holcim - Koromačno Cement Plant	Sisak Oil Power Plant	
Nexe - Našice Cement Plant	Zagreb - El To Gas Power Plant	
	Zagreb - Te To Gas Power Plant	

Source: https://www.industryabout.com/country-territories-3/72-croatia

3.3.6.4. Serbia

Serbia is a country with high market potential, mainly due to dynamic domestic demand and openness to trade and foreign investors. The economic model developed by the Serbian authorities is now promoting exports, taking into account advantages such as geographical position, low-cost and skilled labour and free-trade agreements with the EU, Russia, Turkey and CEFTA member states.

The state benefits from support from the EU and international financial institutions (World Bank, EIB, EBRD) and also loans provided through billatelar agreements capable of mobilising more than 1 billion EUR a year to modernise infrastructure in the country and to support economic investment. Serbia has developed some form of dependence on foreign funding for these programs.

Serbia's industrial sector accounts for 26% of GDP and employs more than a quarter of the working population. The main industries are the mechanical, chemical, metal, food, furniture, textile and pharmaceutical industries. The automotive industry, which also attracts foreign investors, is becoming more and more promising.

In 2017, industrial production grew by 3,5%. In the next two years, analysts predict positive growth of industrial production, in 2019, 4 %, and in 2020, 5%.

The automotive industry is one of the most important sectors of the Serbian economy, representing more than 10 % of exports and around 14 % of the value of foreign investment in the country, along with more than 40.000 jobs.

The history of the Serbian automotive industry dates back to the end of the 1930s, when there was a great local interest in its development, and the Zastava factory made its first car under a license from Fiat. Thanks to its high quality production, Serbia later became a production centre for Mercedes, Opel, Ford and other manufacturers. However, the political situation in the 1990s and the dissolution of Yugoslavia reduced production and foreign capital. The situation in the automotive industry began to change after 2000, and in 2009 the industry was already comprised of six vehicle companies and around 70 car component suppliers.

Today, the Serbian automotive industry is booming. Favourable conditions attract many international investors to the country. About 60 companies from Europe, USA and Asia have invested a total of about 2 billion EUR in the industry and created around 30.000 new jobs. One of the biggest investors in the Serbian automotive industry is Fiat (FCA – Fiat Chrysler Automobile). The company produces more than 100.000 vehicles per year and exports them to the USA and EU markets. The most popular area for foreign investments is the production of motor components and brake pads. Since 2005, many companies have entered the Serbian market for motor components, and their investments have rapidly increased the value of automotive sector.

The interest of investors with regard to the automotive industry is also increasing rapidly. The government supports the development of the industry and strives to attract as many investors as possible. The automotive industry will therefore continue to remain a key sector of the Serbian economy in the future.

In 2017, Serbia exported 14,1 billion EUR worth of goods and imported about 18,1 billion EUR. The deficit in trade in goods thus amounted to 4 billion EUR, representing 10,8 % of GDP. In 2017, Serbia mostly imported goods, consumer goods, mineral fuels, machinery, electrical and electronic equipment and vehicles. The most important foreign trade partner is Germany, from where Serbia imported 12,7 % of total imports in 2017. In 2017, Serbia mostly exported electrical and electronic equipment, vehicles, hardware, plastics and rubber products. The most important export partner is Italy, accounting for 13,2 % of total exports, followed by Germany, Bosnia and Herzegovina, Russia and Montenegro.

Table 3.3.6.4-1: Main import and export groups

The main import groups of goods in 2017	% of the total	The main export groups of goods in 2017	% of the total
Consumer goods	14,8	Electrical and electronic equipment	12,6
Mineral fuels, oil	10,4	Vehicles	8,3
Machinery	8,2	Machinery	6,7
Electrical and electronic equipment	8,2	Plastics and plastic products	4,9
Vehicles	7,4	Rubber products	4,7

Source: www.izvoznookno.si, https://globaledge.msu.edu

Table 3.3.6.4-2: Leading import and export markets

Leading import markets in 2017	% of the total	Leading export markets in 2017	% of the total
Germany	12,7	Italy	13,2
Italy	10,1	Germany	12,6
China	8,2	Bosnia and Herzegovina	8,0
Russia	7,2	Russia	5,9
Hungary	4,8	Montenegro	4,8

Source: www.izvoznookno.si, https://globaledge.msu.edu

The following table shows the list of major business entities in Serbia which are potential railway users (i.e., could use freight transport by rail).

Table 3.3.6.4-3: Major business entities in Serbia which are potential railway users

CEMENT INDUSTRY	COPPER MINING	FOSSIL FUELS ENERGY	IRON AND STEEL INDUSTRY	OIL REFINING
Holcim - Popovac Cement Plant	Bor Copper Concentrator Plant	Kolubara Coal Power Plant	Hesteel - Radinac Integrated Steel Mill	NIS - Novi Sad Oil Refinery
Lafarge - Beočin Cement Plant	Cerovo Copper Mine	Kostolac A Coal Power Plant		NIS - Pančevo Oil Refinery
Titan - Kosjeric Cement Plant	Jama Copper Mine	Kostolac B Coal Power Plant		
AUTOMOTIVE INDUSTRY	Majdanpek Copper Concentrator Plant	Morava Coal Power Plant		

FIAT Srbija (FCA Srbija)	Majdanpek Copper Mine	Nikola Tesla A Coal Power Plant		
	RTB - Bor Copper Refinery	Nikola Tesla B Coal Power Plant		
	RTB - Bor Copper Smelter	Novi Sad Oil Power Plant		
	Veliki Krivelj Copper Mine	Sremska Mitrovica Gas Power Plant		
		Zrenjanin Gas Power Plant		

Source: https://www.industryabout.com/country-territories-3/213-serbia

3.3.6.5. Bulgaria

Bulgaria's economy is growing steadily, with the drivers of growth shifting from the external sector to domestic demand. Bulgaria has developed from a traditional agricultural state to an industrial one. The country has a skilled and low-cost workforce, and almost a third of the population works in the industrial sector. The main natural resources in Bulgaria are bauxite, copper, lead, zinc, coal, lignite (brown coal), iron ore, oil and natural gas.

Bulgarian industry is still dependent on the heavy manufacturing industry, such as metallurgy, the chemical industry and the manufacturing of construction machinery. These were very developed in the times of socialism, and later joined by new industries. The most dynamic sectors are the textile, pharmaceutical and cosmetic industries and, most recently, ICT.

The industrial sector accounts for 25 % of Bulgarian GDP, and employs 26,6 % of the working population. In 2017, the industrial sector grew by 3,6 %. In the next two years, growth is projected to increase by 3,2 % in 2019 and by 1,8 % in 2020.

In 2017, exports amounted to 25,8 billion EUR, while imports amounted 27,8 billion EUR. The deficit in trade in goods amounted to 2 billion EUR in 2017, representing 4 % of GDP. In 2017, Bulgaria mainly imported mineral fuels and oils, hardware, electrical and electronic equipment, vehicles and ores. The most important import countries are Germany (12,2 % of total imports), Russia, Italy, Romania and Turkey. For exports, the largest share is taken by electrical and electronic equipment, copper, hardware, mineral fuels and consumer goods. The leading export markets in 2017 were Germany (13,4 % of total exports), Italy, Romania, Turkey and Greece.

Table 3.3.6.5-1: Main import and export groups

The main import groups of goods in 2017	% of the total	The main export groups of goods in 2017	% of the total
Mineral fuels, oil	14,2	Electrical and electronic equipment	9,9
Machinery	10,0	Copper and copper products	9,1
Electrical and electronic equipment	9,1	Machinery	8,1
Vehicles	6,9	Mineral fuels, oil	8,0
Ores, slag and ash	5,7	Consumer goods	4,1

Source: www.izvoznookno.si, https://globaledge.msu.edu

Table 3.3.6.5-2: Leading import and export markets

Leading import markets in 2017	% of the total	Leading export markets in 2017	% of the total
Germany	12,2	Germany	13,4
Russia	10,2	Italy	8,3
Italy	7,3	Romania	8,2
Romania	7,1	Turkey	7,8
Turkey	6,7	Greece	6,4

Source: www.izvoznookno.si, https://globaledge.msu.edu

The following table shows the list of major business entities in Bulgaria which are potential railway users (i.e., could use freight transport by rail).

Table 3.3.6.5-3: Major business entities in Bulgaria which are potential railway users

BEVERAGE INDUSTRY	COPPER MINING	FOSSIL FUELS ENERGY
Coca-Cola - Kostinbrod Soft Drinks Plant	Assarel Copper Concentrator Plant	Bobov Dol Coal Power Plant
Mineral Water Bankia Water Bottling Plant	Assarel Copper Mine	Gabrovo Coal Power Plant
	Aurubis - Pirdop Copper Refinery	Galabovo Coal Power Plant
CEMENT INDUSTRY	Ellatzite Copper Mine	Maritsa 3 Coal Power Plant
Holcim - Beli Izvor Cement Plant	Mirkovo Copper Concentrator Plant	Maritsa Iztok Coal Power Plant
Holcim - Pleven Cement Plant (Shutdown)	Iron and Steel Industry	Plovdiv Gas Power Plant
Italcementi - Devnya Cement Plant	Stomana Industry - Pernik Steel Mill	Republika Coal Power Plant
Italcementi - Dimitrovgrad Cement Plant	**OIL REFINING**	Ruse Iztok Coal Power Plant
Titan - Zlatna Panega Cement Plant	Lukoil Neftochim - Burgas Oil Refinery	Sliven Coal Power Plant
		Sofia Gas Power Plant
		Sofia Iztok Gas Power Plant

		Varna Coal Power Plant
		Vidachim Coal Power Plant

Source: https://www.industryabout.com/country-territories-3/48-bulgaria

3.3.7. Relevant countries which are not part of the AWB RFC

This subchapter provides information about industries in AWB RFC neighbouring states that may have an impact on freight transport across the AWB RFC (with a focus on Germany, Turkey, North Macedonia, Greece, Italy, and Hungary).

3.3.7.1. Germany

Germany is the largest European economy and the leading exporter of hardware, automobiles, chemicals and household appliances. Germany has a developed labour market, skilled workforce and well-developed infrastructure.

The agricultural sector contributes 1 % of GDP and employs 1,4 % of the working population. The sector has benefited greatly from state subsidies. The main agricultural products are milk, sugar beet and cereals.

The service sector contributes 68 % of GDP. The German economic model relies primarily on the network of small and medium-sized enterprises. These are over 3 million of these, employing over 74 % of the total working population.

The industrial sector in Germany accounts for 31 % of GDP and employs 24,2 % of the working population. The most important industries are the production of mechanical, electrical and electronic equipment and the automotive and chemical industries. The automotive industry is one of the largest industries in the country, and Germany is one of the largest car exporters in the world.

In 2017, Germany recorded industrial production growth of 3,3 %. For 2019, 1,9 % growth is projected, and 1,3 % in 2020.

In 2017, Germany exported 1.269,1 billion EUR of goods and imported 1.044 billion EUR. In 2017, it mainly exported vehicles, machinery, electrical and electronic equipment, pharmaceuticals and optical, technical and medical equipment. The most important export markets in 2017 were the USA (8,7 % of total exports), France, China, the United Kingdom and the Netherlands. In 2017, Germany mainly imported machinery, electrical and electronic equipment, vehicles, mineral fuels and pharmaceutical products. The most important import markets in 2017 were China (9,8 % of total imports), the Netherlands, France, the USA and Italy.

3.3.7.2. Turkey

Turkey's free market economy is largely driven by the industrial and service sectors, although the traditional agricultural sector still represents one-fifth of jobs.

About 20 % of the working population are employed in the agricultural sector, accounting for 7 % of GDP. It is characterised by low productivity and many small farms. The main crop is wheat. Turkey is the third largest tobacco exporter in the world, and the leading hazelnut producer, with 70 % of global production.

The service sector contributes 62 % of GDP and employs more than half of the working population. The leading service industry is tourism, which attracted 32,4 million visitors in 2017, and is one of the key sources of foreign exchange for the country. Turkey is one of the ten most visited countries in the world.

Turkey has plenty of mineral resources, but (as yet) these are not sufficiently exploited. Industrial production accounts for 31 % of GDP and employs 27 % of the workforce. The main activity is the textile industry, where one-third of all employees in the industrial sector work. Other important industrial sectors are the food, construction, automotive, wood, paper and oil industries. The Turkish government gives priority to large infrastructure projects, especially in the transport sector.

In 2017, industrial production grew by 8,6 %. For 2019, analysts predict growth of 6,2 %, and 5,9 % for 2020.

In 2017, exports of goods amounted to 147,1 billion EUR, while imports amounted to 199,2 billion EUR. In the same year Turkey mainly exported vehicles, machinery, precious stones and metals, clothing, iron and steel. The most important export markets were Germany (9,6 % of total exports), the UK, UAE, Iraq and the USA. In 2017, Turkey mainly imported mineral fuels, machinery, electrical and electronic equipment, precious stones, metals and vehicles. The most important import markets in 2017 were China (10,0 % of total imports), Germany, Russia, the USA and Italy.

3.3.7.3. North Macedonia

North Macedonia has a small, open economy, whose further growth and development largely depend on its progress with regard to EU integration.

The agricultural sector accounts for 11 % of GDP and employs 16,6 % of the working population. Mostly rice, cotton, tobacco and fruit are produced. North Macedonia has some mineral wealth, especially iron, copper, and lead.

The service sector accounts for 60 % of GDP and employs 53,8 % of the working population.

The most important segments are transport, telecommunications and energy.

Major industrial sectors of include the production and processing of steel, along with the chemical, machine and textile industries. The textile and clothing (mainly leather) industries are very important, as they employ many people and create new jobs. Industry and mining together account for 29 % of GDP. The industrial sector employs almost 30 % of the working population.

Industrial production in North Macedonia grew by 0,2 % in 2017. For 2019, 3,9 % is forecast, and for the year 2020 the 3,8 % growth is expected.

In 2017, exports of goods amounted to 4,1 billion EUR, while imports were 5,9 billion EUR. The North Macedonian trade deficit in 2017 thus amounted to 1,8 billion EUR. The most important goods in terms of imports are pearls and precious stones, electrical and electronic equipment, mineral fuels, hardware, iron and steel. The most important North Macedonian export markets are Germany and Serbia. North Macedonia exported 47 % of total exports in 2017 to Germany, and 8,4 % to Serbia. The most important import markets are Germany (11,8 % of total imports), the UK, Greece, Serbia and China.

3.3.7.4. Greece

The Greek economy is traditionally based on agriculture. The agricultural sector employs 13 % of the working population and generates 4 % of GDP. The main crops are tobacco (Greece is the largest European tobacco producer) and cotton (Greece is the fifth largest exporter in the world). In the coastal regions fishery is important.

The service sector in Greece is well developed, and this generates 80 % of GDP and employs 72,4 % of the working population. The key source of income is tourism, which contributes 18% of GDP.

The Greek industrial sector accounts for 16 % of GDP and employs 15 % of the working population. The main industrial sectors are the electronics, transport, construction, textile, food, and tobacco, chemical and metal-processing industries. Greece also has the largest fleet of ships in Europe.

In 2017, industrial production grew at 4,9 %. For 2019, industrial production growth is forecast at 3,1 %, and at 2,9% for 2020. The main industries in the Greek market are transport services and tourism.

The most important trading partners for Greece are Germany, Turkey, Italy, Bulgaria and Cyprus. In Greece, maritime freight plays an important role as the country has a very large number of islands. Due to its geostrategic position it has well-developed international maritime routes, and is an important maritime country in the region.

In 2017, Greece exported for 27,9 billion EUR of goods and imported 46,3 billion EUR. The deficit in trade thus amounted to 18,4 billion EUR, which is 10,4 % of GDP. The main export products are mineral fuels, aluminium, machinery and pharmaceutical products. The leading export markets are Italy (10,6 % of total exports), Germany, Turkey, Cyprus and Bulgaria. The most important import products are mineral fuels, hardware, ships and boats, pharmaceuticals and electrical and electronic equipment. The leading import markets are Germany (10,4 % of total imports), Italy, Russia, South Korea and Iraq.

3.3.7.5. Italy

Italy is the third largest economy in the euro area. The more developed northern part of Italy is where private companies are dominant, and the less developed southern part is where agriculture is dominant.

The agricultural sector contributes 2 % of GDP and employs almost 4 % of the working population. Italy is the largest European producer of rice, fruit and vegetables, as well as the world's largest producer and exporter of wine. Italy has limited natural resources and must therefore import most of the raw materials needed for production and more than 80 % of its energy resources.

The textile, fashion, automotive, chemical and pharmaceutical industries play an important role in the industrial sector, as does the production of luxury goods. The industrial sector contributes 24 % of GDP and employs 28,3 % of the working population.

The Italian automotive industry grew in the period 2013 – 2017, and generated 9 billion EUR in 2017. For comparison, French car production reached 36,4 billion EUR in 2017, while German car production reached the value of 78,9 billion EUR. The volume of Italian automobile production increased by 24,4 % between 2013 and 2017, reaching a total of 930.000 units in 2017. According to analysts' forecasts, the volume of production in the next five years will increase by 11 %, reaching 1,6 million units in 2022.

The service sector contributes 74 % of GDP and employs 67,8 % of the population. Tourism plays a major role in this sector, contributing 1,5 % of GDP in 2017.

In 2017, Italy exported goods worth 439,2 billion EUR and imported goods worth 383,2 billion EUR. The most important export goods are hardware, vehicles, electrical and electronic equipment, pharmaceuticals and plastics. The main export markets in 2017 were Germany, France, the USA, Spain and the UK. In 2017, Italy mainly imported oil and gas, vehicles, hardware, electrical and electronic equipment and pharmaceuticals. Its' most important import markets were Germany, France, China, the Netherlands and Spain.

3.3.7.6. Hungary

Over the last few decades Hungary has shifted from a centrally planned to a market economy. Per capita income is about two thirds of the average of the EU member states. The Hungarian economy largely depends on exports, making it vulnerable to external market fluctuations. Hungary is a kind of European connection point, and many companies have their regional headquarters there, including the logistics services and research and development departments. There is also a lot of foreign ownership and foreign investment in Hungarian companies. The agricultural sector was once the leading sector in the economy, but today it presents only 4 % of GDP and employs just 4,9 % of the working population.

The industrial sector, which represents 31 % of GDP and employs 30,3 % of the working population, is very open to foreign investors. The automotive, electronic, food and chemical industries are the most important ones.

The service sector accounts for 65 % of GDP and employs 64,5 % of the workforce. The majority of foreign direct investment is in the this sector, in particular in the areas of telecommunications, retail trade and the finance.

In 2017, industrial production grew by 4,8 %. For 2019, industrial production is forecast to grow at 4,1 %, and for 2020 at 1,9 %.

In 2017, Hungary exported 87,3 billion EUR of goods and imported 85,1 billion. Approximately 80 % of Hungarian exports are directed to EU markets. The most important export market for Hungary is Germany (27,6 % of total exports), followed by Romania, Italy, Austria and Slovakia. The most important export products are electrical and electronic equipment, vehicles, pharmaceuticals and plastics. The most important import market for Hungary is Germany (25,4 % of total imports), followed by Austria, China, Poland and Slovakia. The most important imports are electrical and electronic equipment, vehicles, mineral fuels and plastics.

3.4. Analysis of transport and traffic indicators

3.4.1. Transport infrastructure of the AWB RFC countries

The sustainable economic development of the country depends, *inter alia*, on the quality, density and development of its transport infrastructure as a tool necessary for the movement of goods and people. Each country thus manages and invests in the development and construction of this, as a high-quality and accessible transport infrastructure contributes to the overall development of the national economy. Tables 3.4.1.-1 to 3.4.1-3 show an analysis of the development of rail and road infrastructure of the AWB RFC countries.

Table 3.4.1-1: Railway infrastructure – length of railway lines (total), all tracks in km

Country	1995	2000	2005	2010	2013	2014	2015	2016	2017
Austria	5.672	5.563	N/A	5.828	5.531	5.531	5.522	5.491	5.527
Slovenia	1.201	1.201	1.228	1.228	1.209	1.209	1.209	1.209	1.209
Croatia	2.726	2.726	2.726	2.722	2.722	2.604	2.604	2.604	2.604
Serbia	N/A	3.809	3.809	3.809	3.809	3.809	3.809	3.809	3.809
Bulgaria	4.293	4.320	4.154	4.098	4.032	4.023	4.019	4.029	4.030

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database; Source for Serbia: https://www.nationmaster.com/country-info/profiles/Serbia/Transport/All-stats

Table 3.4.1-2: Length of motorways (total) in km

Country	1995	2000	2005	2010	2013	2014	2015	2016
Austria	1.596	1.633	1.677	1.719	1.719	1.719	N/A	N/A
Slovenia	277	382	569	768	769	769	773	773
Croatia	302	411	1.016*	1.244*	1.289	1.290	1.310	1.310
Serbia	N/A	N/A	N/A	687	747	747	747	790
Bulgaria	N/A	324	331	437	605	610	734	740

** definition differs*

Source:EUROSTAT:https://ec.europa.eu/eurostat/web/transport/data/database; Source for Serbia: https://www.nationmaster.com/country-info/profiles/Serbia/Transport.

Table 3.4.1-3: Length of other roads (total), all categories (state, provincial, communal roads) in km

Country	1995	2000	2005	2010	2013	2014	2015	2016
Austria	104.716	104.997	105.663	112.871	122.872	122.869	N/A	N/A
Slovenia	14.513	37.866	37.293	38.106	37.922	37.932	37.939	38.005
Croatia	26.626	27.712	27.420	28.089	25.525	25.488	25.396	25.444
Serbia	N/A	37.574	38.616	43.673	43.997	44.406	44.995	45.410
Bulgaria	36.443	36.977	18.957	19.019	19.073	19.118	19.119	19.162

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database ; Source for Serbia: Statistical yearbooks of the Republic of Serbia.

Based on the statistical data in Tables 3.4.1.-1 to 3.4.1-3, we can confirm the decline in the length of railway infrastructure in the monitored period in Croatia and Bulgaria. The same trend is evident in Austria, especially after 2010. In Slovenia the length of railway lines is mostly constant, the value only changing because of a change in the categorisation method. In contrast, increases in the length of the transport infrastructure is recorded for the motorways of all the countries. The trend of motorway construction is mainly influenced by performances in individual motoring and road goods transport. Less typical is changing the length of other roads. The most significant increase is recorded in Austria. In Bulgaria the increase is gradual, except between 2000 and 2005 when there was a great reduction for other reasons. In Slovenia the network of other roads in general increases with exceptions before 2005 and

2013. The opposite is true for Croatia, where the length of other roads slowly decreases, with exceptions before 2000 and 2010 and between 2015 and 2016.

The following table provides an analysis of expenditures on railway and road infrastructure investment in the AWB RFC countries.

Table 3.4.1-4: Expenditure on railway and road infrastructure investment in EUR for the period 2012 – 2016

	2012		2013		2014		2015		2016	
	Investment in railway infrastructure	Investment in road infrastructure	Investment in railway infrastructure	Investment in road infrastructure	Investment in railway infrastructure	Investment in road infrastructure	Investment in railway infrastructure	Investment in road infrastructure	Investment in railway infrastructure	Investment in road infrastructure
Austria	1.668.000.000	327.000.000	1.648.000.000	363.000.000	1.567.000.000	453.000.000	1.549.000.000	455.000.000	1.523.000.000	444.000.000
Slovenia	72.000.000	102.000.000	140.000.000	104.000.000	270.000.000	128.000.000	376.000.000	102.000.000	84.400.000	100.000.000
Croatia	61.824.419	478.640.661	183.137.617	424.198.443	130.720.666	279.516.936	60.021.014	238.376.675	44.329.418	197.358.816
Serbia	2.947.445	256.587.053	9.329.348	279.287.963	11.773.659	336.982.599	83.081.377	505.058.875	73.320.275	493.833.379
Bulgaria	114.019.838	387.565.191	123.734.533	359.443.706	167.195.010	252.582.064	301.155.537	252.582.064	301.155.537	252.582.064

Source: OECD.

Rail infrastructure investments in Western European countries have gradually increased in recent years, while Central and East European (CEE) countries have focused more on road infrastructure. Due to the political commitment on the development of railways in Western European countries, the share of railway transport investments has constantly increased from around 20 % of that related to surface transport infrastructure (in 1975) to 30 % in 1995 and 40 % in 2010. Statistics show once more the difference between railway infrastructure grants in the west and in the east of Europe. Therefore, while Western European countries have directed their funds to railway infrastructure, CEE countries have focused on roads, where the share of road transport in surface transport has increased from 65 % (in 1995) to 82 % (in 2010).

Although railway transport is significantly promoted in Europe because people have become aware of the importance and benefits it brings to the economy, in real terms, the allocation of investments in infrastructure varies a lot. For the period 1995 – 2008 the figures show that investments in road infrastructure had priority over railway investments. In 2000 railway investments in CEE countries stood at 22,7 % of such infrastructure spending with road investments at 74,4 %, while in 2008 railway investments dropped to 17,9 %, while road investments increased to 79,7 % (source: www.railwaypro.com). If more is not spent on the railway infrastructure, them both freight volumes and passengers will continue to fall and shift to roads.

The following table provides an analysis of expenditures on railway and road infrastructure maintenance in the AWB RFC countries.

Table 3.4.1-5: Expenditure on railway and road infrastructure maintenance in EUR in period 2013 – 2016

	2013		2014		2015		2016	
	Expenditures on railway infrastructure maintenance	Expenditures on road infrastructure maintenance	Expenditures on railway infrastructure maintenance	Expenditures on road infrastructure maintenance	Expenditures on railway infrastructure maintenance	Expenditures on road infrastructure maintenance	Expenditures on railway infrastructure maintenance	Expenditures on road infrastructure maintenance
Austria	497.000.000	559.000.000	504.000.000	667.000.000	503.000.000	692.000.000	535.000.000	697.000.000
Slovenia	71.000.000	123.000.000	101.000.000	113.000.000	110.000.000	126.000.000	89.800.000	138.000.000
Croatia	102.124.291	208.998.549	105.702.984	257.380.871	100.735.487	245.074.862	87.729.776	234.388.480
Serbia	8.957.943	129.160.624	9.248.295	142.981.705	8.840.912	163.039.020	7.043.621	180.883.759
Bulgaria	41.926.577	95.613.048	49.596.073	92.545.250	32.723.182	92.545.250	32.723.182	92.545.250

Source: OECD.

The overall long-term trend in the growth of expenditures on the different kind of transport infrastructure maintenance in the monitored period is mainly influenced by the 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 for the transport infrastructure will continue to increase in the future, as an increase in the 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 AWB RFC countries. The expenditures on maintenance will also be affected by the technical and technological parameters of the new and upgraded transport infrastructure, so that it can meet the conditions of a high quality and safe transport infrastructure.

3.4.2. Analysis of transport indicators

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

All data contained in this subchapter was provided by EUROSTAT. 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 utilisation of railway infrastructure over time. On the basis of the above this, the modal split and traffic volume are presented for the five countries for the years 2000 – 2017.

The modal split for passenger transport include traveling by trains, buses or trams and cars. The modal split for freight transport is divided into rail, road and waterway transport. An important indicator for the transport potential of AWB RFC is railway transport volume. The passenger traffic volume represents the number of passengers, passenger-km and passenger train-km. Freight traffic volume shows goods-tonnes, tonne-km, goods train-km and number of containers and swap bodies.

3.4.2.1. Austria

This subchapter analyses the development of total passenger and freight transport performances in the Republic of Austria. The tables below show a numerical comparison of the modal split in passenger and freight transport in 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes in modal split following the adoption of measures to support rail transport within the EU.

Modal split

Table 3.4.2.1-1: Modal split for passenger transport in Austria (%)

Transport mode	2000	2005	2010	2015	2016
Train	9,7	9,8	11,0	12,0	12,1
Bus, Tram	11,3*	10,8*	10,6*	10,2*	10,2*
Car	79	79,4	78,4	77,8	77,7

** estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.1-2: Modal split for freight transport in Austria (%)

Transport mode	2005	2010	2015	2016
Rail	35,7	33,0	32,1	31,5
Road	61,0	63,0	65,0	65,5
Waterways	3,3	4,0	2,9	3,0

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Based on the comparison of modal split in Austria, we can confirm the decrease in share of the freight transport performances in the rail transport system in favour of road goods transport. The situation in passenger transport is reversed, as train transport increases in relation to public and individual road transport.

Transport volume

Table 3.4.2.1-3: Volume of passenger transport in Austria

Parameter	2005	2010	2015	2016	2017
Passengers (thousand)	220.116	239.974	280.060	286.990	288.503
Passenger-km (million)	8.685	10.263	12.104	12.497	12.562
Passenger train-km (thousand)	94.757	106.513	111.517	112.153	114.784

** estimated by Eurostat*
Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.1--4 : Volume of freight transport in Austria

Parameter	2005	2010	2015	2016	2017
Goods – tonnes (thousand)	101.829	107.670	100.163	102.835	107.579
Tonne – km (million)	18.957	19.833	20.814	21.361	22.256
Goods train-km (thousand)	49.160	45.318	41.878	41.558	41.624
Containers and swap bodies	738.589	1.057.070	1.079.800	N/A	N/A

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the traffic volume in passenger and freight transport in 2005, 2010, 2015, 2016 and 2017.

The analysis of traffic volume performances in Austria shows the gradual increase in rail passenger transport (total: passengers, passenger-km and train-km). In goods transport in Austria we can see fluctuations with regard to the figures for tonnes, while tonne-km and number of containers both increase and train-km decreases.

3.4.2.2. Slovenia

This subchapter analyses the development of total passenger and freight transport performances in the Republic of Slovenia. The tables below show a numerical comparison of the modal split in passenger and freight transport in for the years 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes in modal split following the adoption of measures to support rail transport within the EU.

Modal split

Table 3.4.2.2-1: Modal split for passenger transport in Slovenia (%)

Transport mode	2000	2005	2010	2015	2016
Train	2,9	2,7	2,4	2,1	2,0
Bus, Tram	14,2	11,7	10,8	11,8*	11,8*
Car	82,9	85,6	86,8	86,1*	86,2*

** estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.2--2: Modal split for freight transport in Slovenia (%)

Transport mode	2005	2010	2015	2016
Rail	30,8	31,8	35,0	33,3
Road	69,2	68,2	65,0	66,7
Waterways	N/A	N/A	N/A	N/A

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Based on the comparison of modal split in Slovenia, we can confirm the decrease in the share of the passenger transport performances in the rail transport system and generally in public road traffic (with a slight increase after 2010) in favour of private driving due to large investments in road infrastructure. The situation in goods transport is reversed, as train freight transport increased in relation with road freight transport, except between 2015 and 2016.

Transport volume

Table 3.4.2.2-3: Volume of passenger transport in Slovenia

Parameter	2005	2010	2015	2016	2017
Passengers (thousand)	15.402	15.782	14.135	13.650	13.002
Passenger-km (million)	716	729	628	611	570
Passenger train-km (thousand)	10.758	10.717	9.562	10.290	10.283

** estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.2-4: Volume of freight transport in Slovenia

Parameter	2005	2010	2015	2016	2017
Goods – tonnes (thousand)	16.344	16.234	17.832	18.595	21.275
Tonne – km (million)	3.245	3.421	4.175	4.360	5.128
Goods train-km (thousand)	7.877	7.871	8.171	8.530	9.641
Containers and swap bodies	91.796	202.887	281.041	287.714	305.325

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the traffic volume in passenger and freight transport for the years 2005, 2010, 2015, 2016 and 2017. The comparison is made with bands of five years, giving a sufficient time span for the market response to the changes of the transport market following the adoption of measures to support trends in transport within the EU.

The analysis of traffic volume performances in Slovenia shows the decrease in rail passenger transport after 2010, gradually lower number of passengers, passenger-km and in general train-km. For goods transport in Slovenia we can confirm an increase in tonne-km, goods train-km, number of containers and goods tonnes, especially after 2010.

3.4.2.3. Croatia

This subchapter analyses the development of total passenger and freight transport performances in the Croatia. The tables below show a numerical comparison of the modal split in passenger and freight transport for the years 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes in modal split following the adoption of measures to support rail transport within the EU.

Modal split

Table 3.4.2.3-1: Modal split for passenger transport in Croatia (%)

Transport mode	2000	2005	2010	2015	2016
Train	5,1	4,3	5,6	3,1	2,7
Bus, Tram	13,5	11,9	10,7’’	11,0	12,3
Car	81,4*	83,8*	83,7*	85,9	85,0

** estimated by Eurostat* *’’ definition differs*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.3-2: Modal split for freight transport in Croatia (%)

Transport mode	2005	2010	2015	2016
Rail	20,0*	22,8	19,4	17,3*
Road	73,9*	69,0	72,8	75,5*
Waterways	6,1*	8,2	7,8	7,2*

**estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the modal split in passenger and freight transport for the years 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of the transport market following the adoption of measures to support trends in transport within the EU.

Based on the comparison of modal split in Croatia, we can confirm the decrease in share of the passenger and freight transport performances in the rail transport system (except in 2010). Regarding road transport, it is evident that public passenger and freight transport was decreasing until 2010 and increasing after this, while individual road traffic in general increases.

Transport volume

Table 3.4.2.3-3: Volume of passenger transport in Croatia

Parameter	2005	2010	2015	2016	2017
Passengers (thousand)	39.706	69.421	21.649	20.709	19.803
Passenger-km (million)	1.227	1.711	941	827	736
Passenger train-km (thousand)	18.371	18.992	14.883	15.300	15.195

** estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.3-4: Volume of freight transport in Croatia

Parameter	2005	2010	2015	2016	2017
Goods – tonnes (thousand)	14.333	12.203	9.939	N/A	12.178
Tonne – km (million)	2.835	2.618	2.184	N/A	2.592
Goods train-km (thousand)	7.693	6.782	4.833	N/A	5.819
Containers and swap bodies	36.877	47.816	25.264	N/A	N/A

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the traffic volume in passenger and freight transport for the years 2005, 2010, 2015, 2016 and 2017. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of the transport market following the adoption of measures to support trends in transport within the EU.

The analysis of traffic volume performances in Croatia shows a decrease in rail passenger transport after 2010, a gradual lower number of passengers, passenger-km and in general train-km. Regarding goods transport in Croatia, we can confirm decreases in goods tonnes, tonne-km, goods train-km and number of containers until 2015, but in 2017 the volume of goods transported increased again.

3.4.2.4. Serbia

This subchapter analyses the development of total passenger and freight transport performances in Serbia for the years 2000, 2005, 2010, 2015, 2016 and 2017.

Modal split

Table 3.4.2.4-1: Modal split for passenger transport in Serbia (%)*

Transport mode	2000	2005	2010	2015	2016
Train	13,9	7,0	5,0	4,9	4,4
Bus, Tram	51,7	45,7	50,0	50,6	52,2
Car	34,4	47,3	45,0	44,5	43,4

*calculated on the basis of passenger km.
Source: Statistical yearbook of the Republic of Serbia.

Table 3.4.2.4--2: Modal split for freight transport in Serbia (%)

Transport mode	2000	2005	2010	2015	2016
Rail	55,1	60,2	57,9	45,8	37,2
Road	16,7	11,8	27,8	42,0	51,7
Waterways (inland)	28,2	28,0	14,3	12,2	11,1

*calculated on the basis of ton-kilometres.

The tables above show a numerical comparison of the modal split in passenger and freight transport for the years 2000, 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of transport market following the adoption of measures to support trends in transport within the EU.

Based on the comparison of modal split in Serbia, we can confirm the decrease in the share of the passenger transport performances in rail transport system. Public road traffic is constant during the analysed period, while usage of private cars is increasing. The situation in goods transport is the same, astrain freight transport decreases in relation to road freight transport, with the later increasing.

Transport volume

Table 3.4.2.4-3: Volume of passenger transport in Serbia

Parameter	2000	2005	2010	2015	2016	2017
Passengers (thousand)	10.583	6.492	5.270	6.258	6.092	5.638
Passenger-km (million)	1.236	713	522	509	438	377
Passenger train-km (thousand)	16.499	17.843	13.894	16.256	10.930	16.644

Source: Statistical yearbook of the Republic of Serbia.

Table 3.4.2.4-4: Volume of freight transport in Serbia

Parameter	2000	2005	2010	2015	2016	2017
Goods – tonnes (thousand)	8.587	12.568	12.581	11.887	11.896	12.352
Tonne – km (million)	1.917	3.482	3.522	3.249	3.087	3.288
Goods train-km (thousand)	3.653	7.035	6.780	5.919	5.103	4.997
Containers and swap bodies (wagon stock)	15.254	10.561	8.980	8.486	7.277	6.781

Source: Statistical yearbook of the Republic of Serbia.

The tables above show a numerical comparison of the traffic volume in passenger and freight transport in the years 2000, 2005, 2010, 2015, 2016 and 2017. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of transport market following the adoption of measures to support trends in transport within the EU.

The analysis of traffic volume performances in Serbia shows the decrease in rail passenger transport after 2000, with gradually lower numbers of passengers and passenger-km. Regarding goods transport in Serbia, there are increases in goods tonnes, tonne-km, goods train-km.

3.4.2.5. Bulgaria

This subchapter analyses the development of total passenger and freight transport performances in the Republic of Bulgaria. The tables below show a numerical comparison of the modal split in passenger and freight transport for the years 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes in modal split following the adoption of measures to support rail transport within the EU.

Modal split

Table 3.4.2.5-1: Modal split for passenger transport in Bulgaria(%)

Transport mode	2000	2005	2010	2015	2016
Train	7,8	4,8	3,6	2,3	2,2
Bus, Tram	31,4’’	24,3	16,4	14,6	14,1
Car	6,8*	70,9*	80,0’’	83,1*	83,7*

’’break in time series **estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.5-2: Modal split for freight transport in Bulgaria (%)

Transport mode	2005	2010	2015	2016
Rail	23,5*	17,0	17,9	17,1
Road	50,2*	49,4	54,7	55,7
Waterways	26,3*	33,6	27,4	27,2

**estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the modal split in passenger and freight transport for the years 2000 (only passenger), 2005, 2010, 2015 and 2016. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of transport market following the adoption of measures to support trends in transport within the EU.

Based on the comparison of modal split in Bulgaria, we can confirm the gradual decrease in the share of the passenger rail and public road transport performances and also in goods rail transport after 2005, but from 2010 it has more or less a constant share of the freight rail transport system. Individual passenger road transport is also shown to increase, as does freight road transport after 2010, in contrast to the decline in waterway transport.

Transport volume

Table 3.4.2.5-23: Volume of passenger transport in Bulgaria

Parameter	2005	2010	2015	2016	2017
Passengers (thousand)	N/A	30.079	22.518	21.425	21.195
Passenger-km (million)	N/A	2.090	1.549	1.455	1.434
Passenger train-km (thousand)	N/A	23.069	20.905	21.354	20.089

** estimated by Eurostat*

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

Table 3.4.2.5-34: Volume of freight transport in Bulgaria

Parameter	2005	2010	2015	2016	2017
Goods – tonnes (thousand)	N/A	12.939	14.635	14.226	16.030
Tonne – km (million)	N/A	3.064	3.650	3.434	3.931
Goods train-km (thousand)	N/A	6.238	7.659	8.155	8.923
Containers and swap bodies	N/A	41.150	26.793	38.073	33.798

Source: EUROSTAT https://ec.europa.eu/eurostat/web/transport/data/database.

The tables above show a numerical comparison of the traffic volume in passenger and freight transport in 2005, 2010, 2015, 2016 and 2017. The comparison is made in bands of five years, giving a sufficient time span for the market response to the changes of transport market following the adoption of measures to support trends in transport within the EU.

The analysis of traffic volume performances in Bulgaria shows the decrease in rail passenger transport after 2010, and gradually lower numbers of passengers, passenger-km and in general train-km. Regarding goods transport in Bulgaria, we can confirm increased goods train-km and a general increase in goods tonnes, tonne-km, while the number of containers varied but in general decreased after 2010.

3.5. AWB RFC – Rail transport analysis

This subchapter is aimed at the analysis of the most important railway transport data that are necessary to determine the AWB 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 data has been provided by railway infrastructure managers along the AWB RFC, in ÖBB (Austria), SŽI (Slovenia), HŽI (Croatia), IŽS (Serbia) and NRIC (Bulgaria).

3.5.1. Cross border sections

From Austria to Turkey trains cross five state borders, presented in the following table:

Table 3.5.1-1: Border crossing sections along AWB RFC

From State	To state	From Station	To Station
Austria	Slovenia	Rosenbach (A)	Jesenice (SLO)
Austria	Slovenia	Spielfeld-Straß (A)	(Šentilj)Maribor (SLO)
Slovenia	Croatia	Dobova (SLO)	Savski Marof (HR)
Croatia	Serbia	Tovarnik (HR)	Šid (SRB)
Serbia	Bulgaria	Dimitrovgrad (SRB)	Dragoman (BG)
Bulgaria	Turkey	Svilengrad (BG)	Kapikule-Edirne (TR)

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC

Transport volume depends to the different border crossings. The following table and figure presents the volume of gross tonnes and freight trains in 2017 on cross border sections.

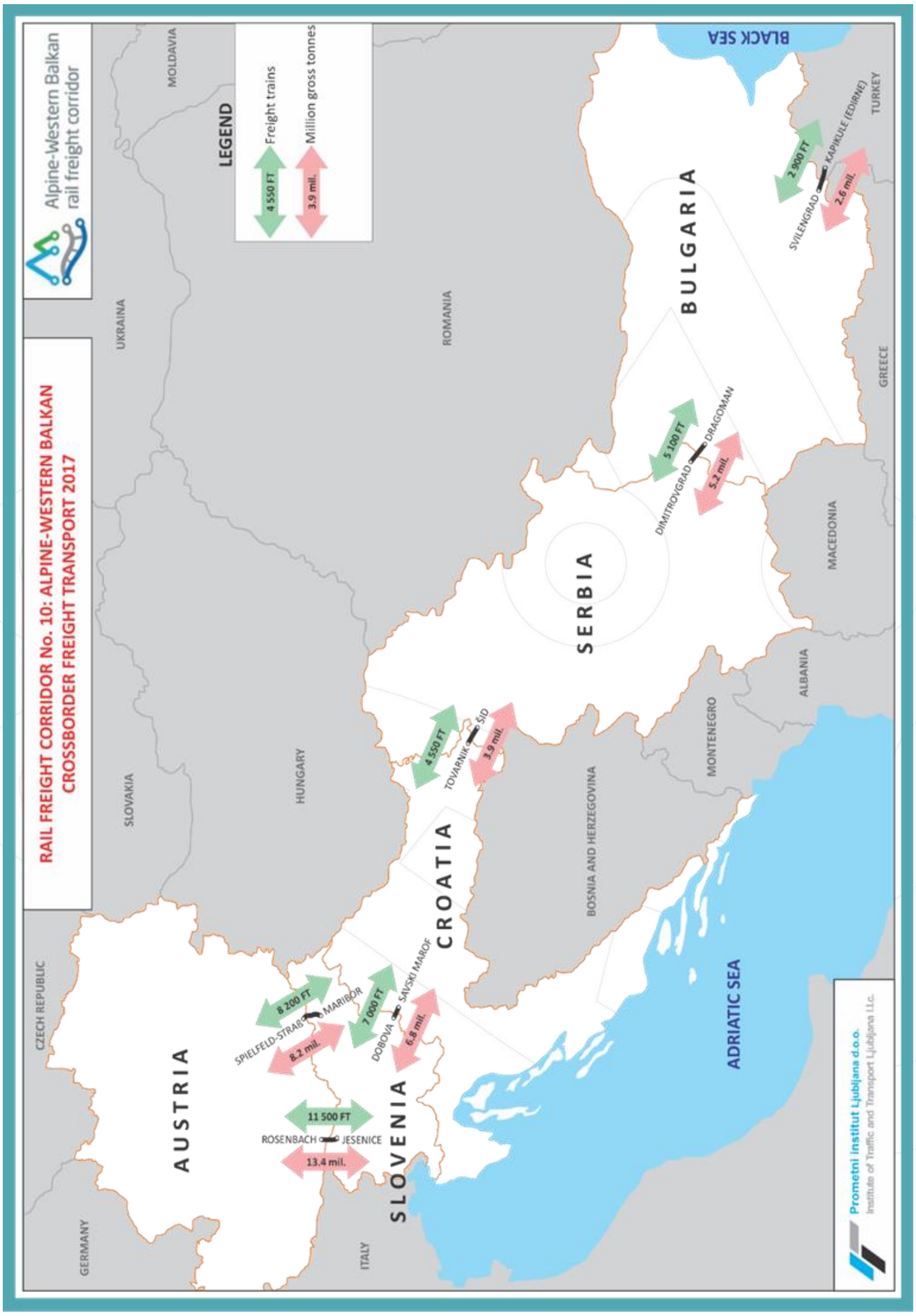
Table 3.5.1--2: Freight volume on border sections along AWB RFC in 2017

From Station	To Station	Freight trains	Mill. gross tons
Rosenbach (A)	Jesenice (SLO)	11.500	13,4
Spielfeld-Straß (A)	(Šentilj) Maribor (SLO)	8.200	8,2
Dobova (SLO)	Savski Marof (HR)	7.000	6,8
Tovarnik (HR)	Šid (SRB)	4.550	3,9
Dimitrovgrad (SRB)	Dragoman (BG)	5.100	5,2
Svilengrad (BG)	Kapikule-Edirne (TR)	2.900	2,6

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC

The cross border section between Rosenbach (Austria) and Jesenice (Slovenia) has the highest freight transport volume for trains and gross tons. The lowest volume is between Bulgaria and Turkey.

Figure 3.5.1-1: Cross border freight transport in 2017



An analysis of conditions and procedures for rail freight at border crossings shows that huge improvements could be made, *inter alia*, by streamlining procedures at such locations. The average stopping times of freight trains at the AWB RFC border crossings are generally in the range of several hours. An in-depth analysis of operational conditions at the border crossings showed clear reasons for this: many of the border crossings in the south-eastern part of the corridor are less efficiently organised than the Central European ones. There is significant potential to implement specific improvements to facilitate cross-border train operations, including measures such as mutual trust agreements or a closer cooperation in border and customs controls at border stations.

Various different operations and procedures are carried out at border stations: customs clearance, police procedures, locomotive changes, etc. The next table and figure present the waiting times at border stations for both freight and passenger trains. The change of locomotive for diesel traction at Niš station for the section Niš-Dimitrovgrad is also presented in the table.

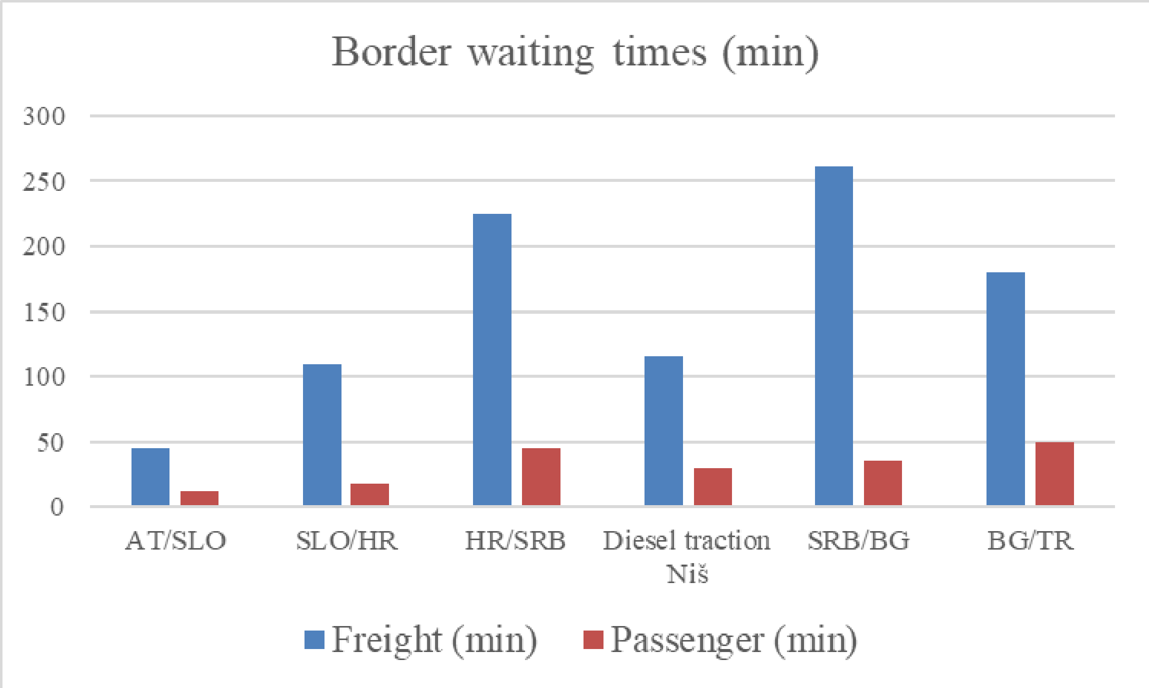
Table 3.5.1-3: Border waiting times along the AWB RFC

Border	Freight (min)	Passenger (min)
AT/SLO	45	12
SLO/HR	110	18
HR/SRB	225	45
Diesel traction Niš	115	30
SRB/BG	261	35
BG/TR	180	50
Total (min)	**936**	**190**
Total (hours)	**15,60**	**3,17**

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

A freight train from Austria to Turkey needs about 15.60 hours for different border procedures. For the same route an international passenger train needs about 3,17 hours.

Figure 3.5.1-2: Graph of waiting times along the AWB RFC



Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

3.5.2. Freight volume

A freight train (goods train) is a group of freight wagons (cars) hauled by one or more locomotives on a railway, transporting cargo on a complete route or a part of it between the shipper and intended destination as part of a logistics chain. The locomotives on the freight trains may haul bulk material, intermodal containers, general freight or specialised freight in purpose-designed cars.

The AWB RFC sections with over 50.000 trains in 2017:

- Austria: Salzburg-Schwarzach-St.Veit; Wels-Marchtrenk; St. Michael-Graz
- Slovenia: Ljubljana-Zidani Most
- Croatia: Zaprešić-Zagreb
- Serbia: Batajnica-Beograd

The following two figures present:

- volume of all trains along the AWB RFC in 2017
- freight trains share along the AWB RFC in 2017

Figure 3.5.2-1: Volume of all trains along the AWB RFC in 2017

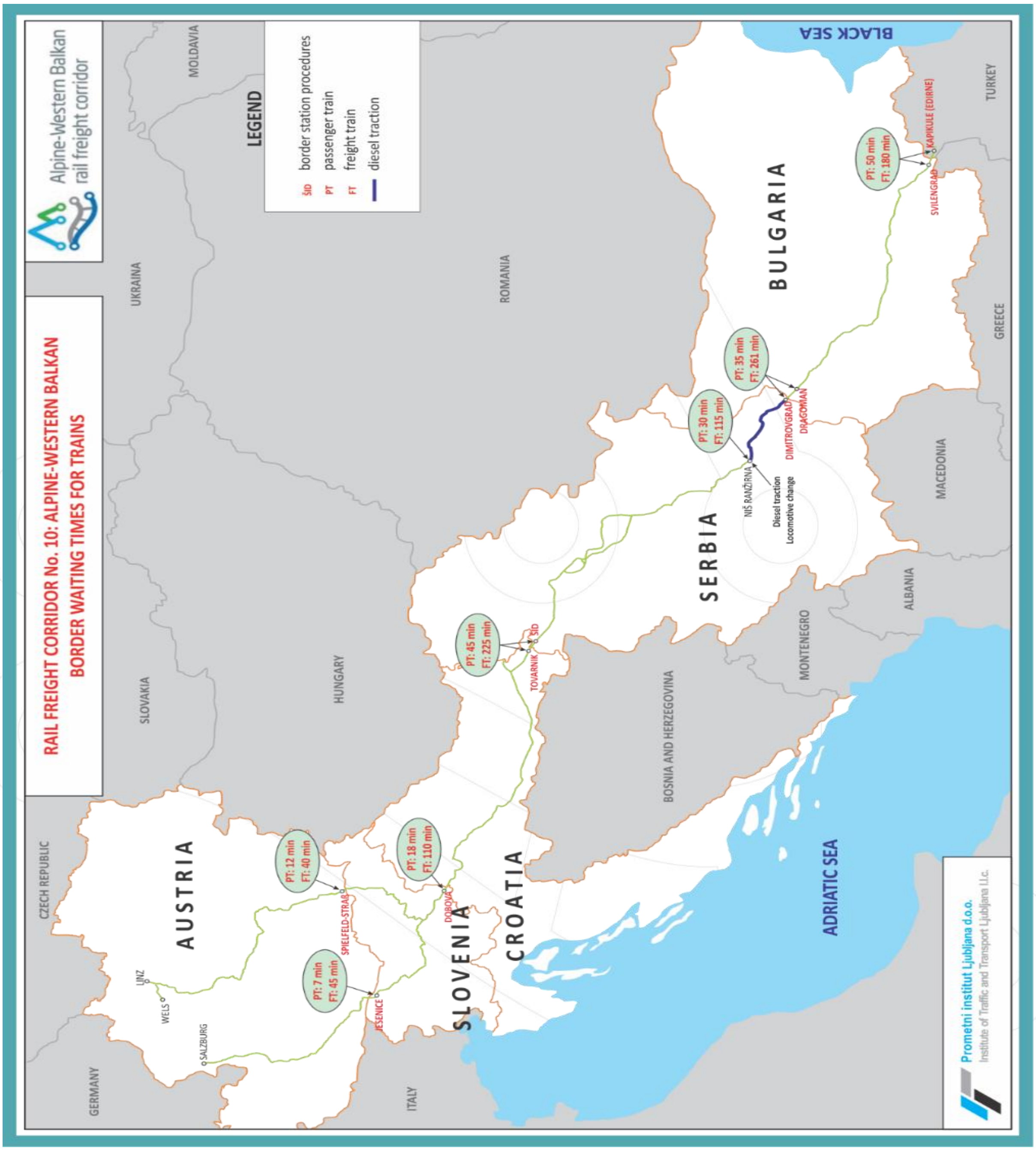
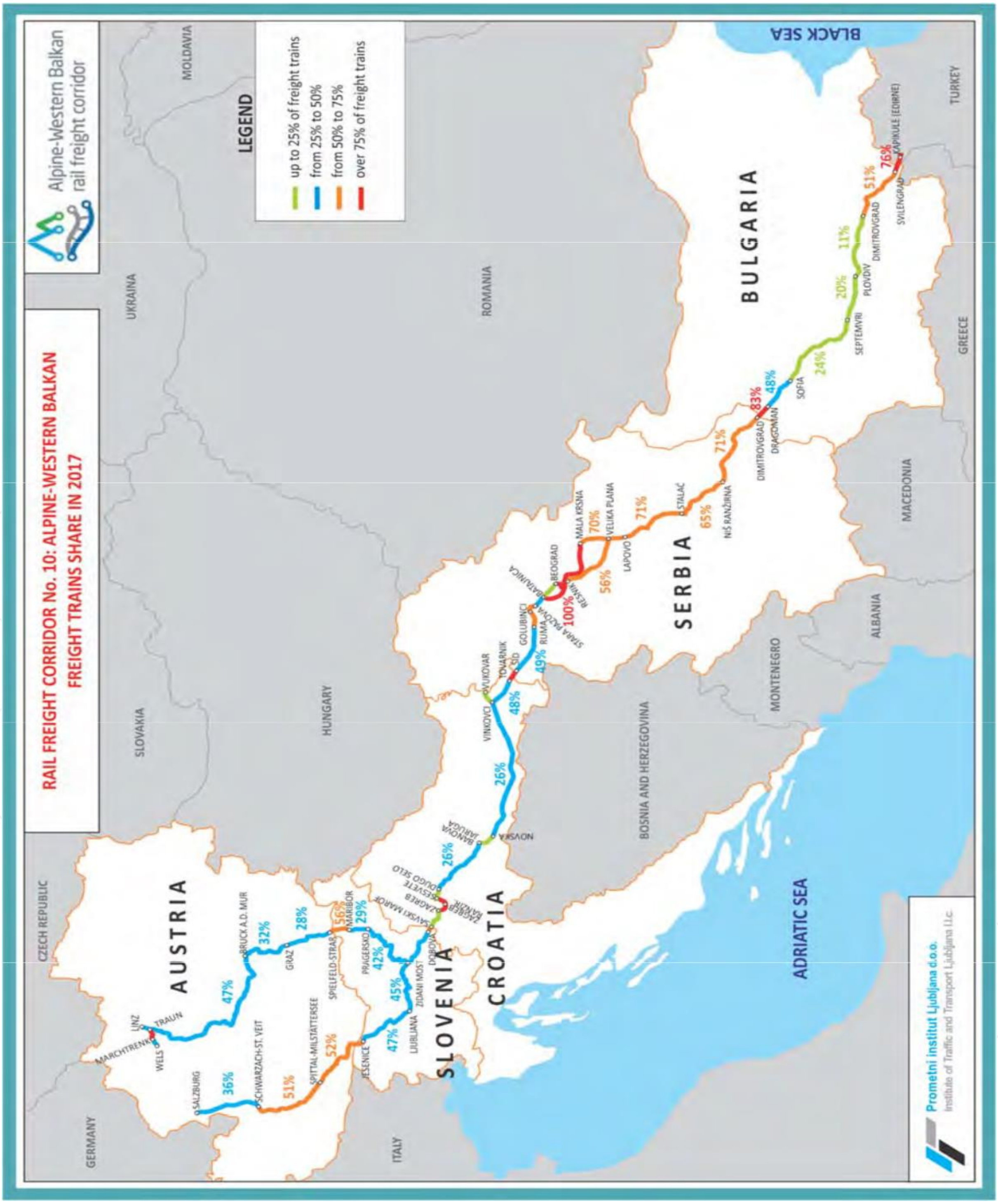


Figure 3.5.2-2: Freight trains share along the AWB RFC in 2017



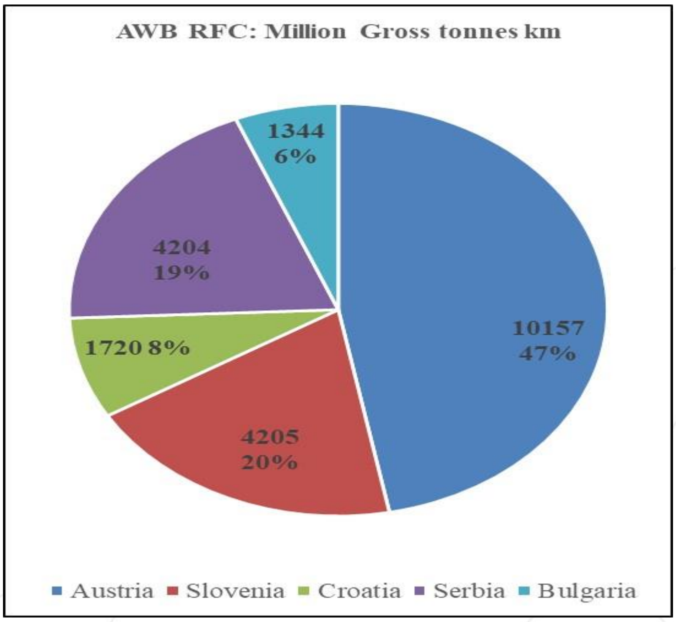
A gross tonnes kilometre is a unit of measure of freight transport which represents the transport of one tonne of goods (including packaging and tare weights of intermodal transport units) by a given transport mode (road, rail, air, sea, inland waterways, pipeline etc.) over a distance of one kilometre. Gross tonnes km for the AWB RFC are presented in the following table and graph.

Table 3.5.2-1: Volume of gross tonnes km along the AWB RFC in the period 2014 – 2017

State	**AWB RFC: Million Gross tonnes km**			
	2014	**2015**	**2016**	**2017**
Austria	9.972	9.525	9.356	10.157
Slovenia	3.631	3.552	3.839	4.205
Croatia	1.511	1.430	1.512	1.720
Serbia	3.661	3.811	3.345	4.204
Bulgaria	1.264	1.329	1.374	1.344
Total	**20.039**	**19.647**	**19.426**	**21.630**

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

Figure 3.5.2-3: Volume of gross tonnes km along the AWB RFC in 2017



Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

A total of 47 % of the gross tonnes km on the AWB RFC in 2017 was made in Austria, 20 % in Slovenia, 19 % in Serbia and less than 10 % in Croatia and Bulgaria.

The next table presents the share of gross tonnes km on the AWB RFC compared to all the national railway networks.

Table 3.5.2-2: Share of gross tonnes km on the AWB RFC compared to all the national rail networks

State	AWB RFC share of gross tonnes km		
	2015	2016	2017
Austria	46 %	44 %	46 %
Slovenia	85 %	88 %	82 %
Croatia	65 %	65 %	66 %
Serbia	76 %	76 %	75 %
Bulgaria	36 %	40 %	34 %

Source: EUROSTAT and railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

The share of applied gross tonnes km on the AWB RFC in Austria, compared to that on the whole national rail network, is less than 50%. In Slovenia the share is over 80 % in Croatia about 65 %, in Serbia about 76 % and in Bulgaria less than 40 %.

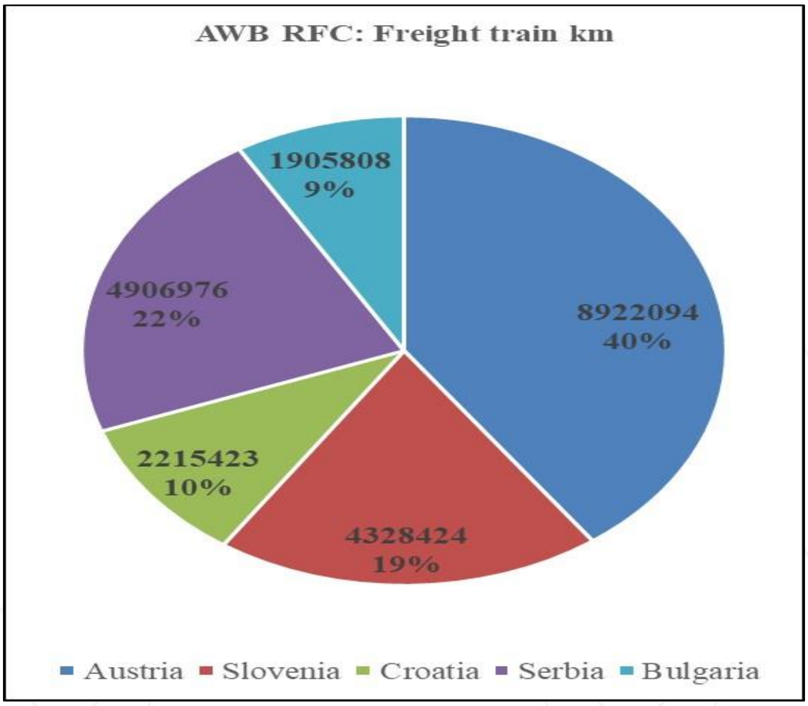
The following table and figure presents the freight train kilometres along AWB RFC.

Table 3.5.2-3: Volume of freight train km along the AWB RFC in the period 2014 – 2017

State	AWB RFC: Freight train km			
	2014	**2015**	**2016**	**2017**
Austria	8.038.148	7.725.358	7.556.102	8.922.094
Slovenia	3.940.631	3.789.766	4.103.074	4.328.424
Croatia	1.478.695	1.391.359	1.552.706	2.215.423
Serbia	4.338.150	4.471.073	3.866.123	4.906.976
Bulgaria	1.891.443	1.971.021	2.065.301	1.905.808
Total	**19.687.067**	**19.348.578**	**19.143.306**	**22.278.726**

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

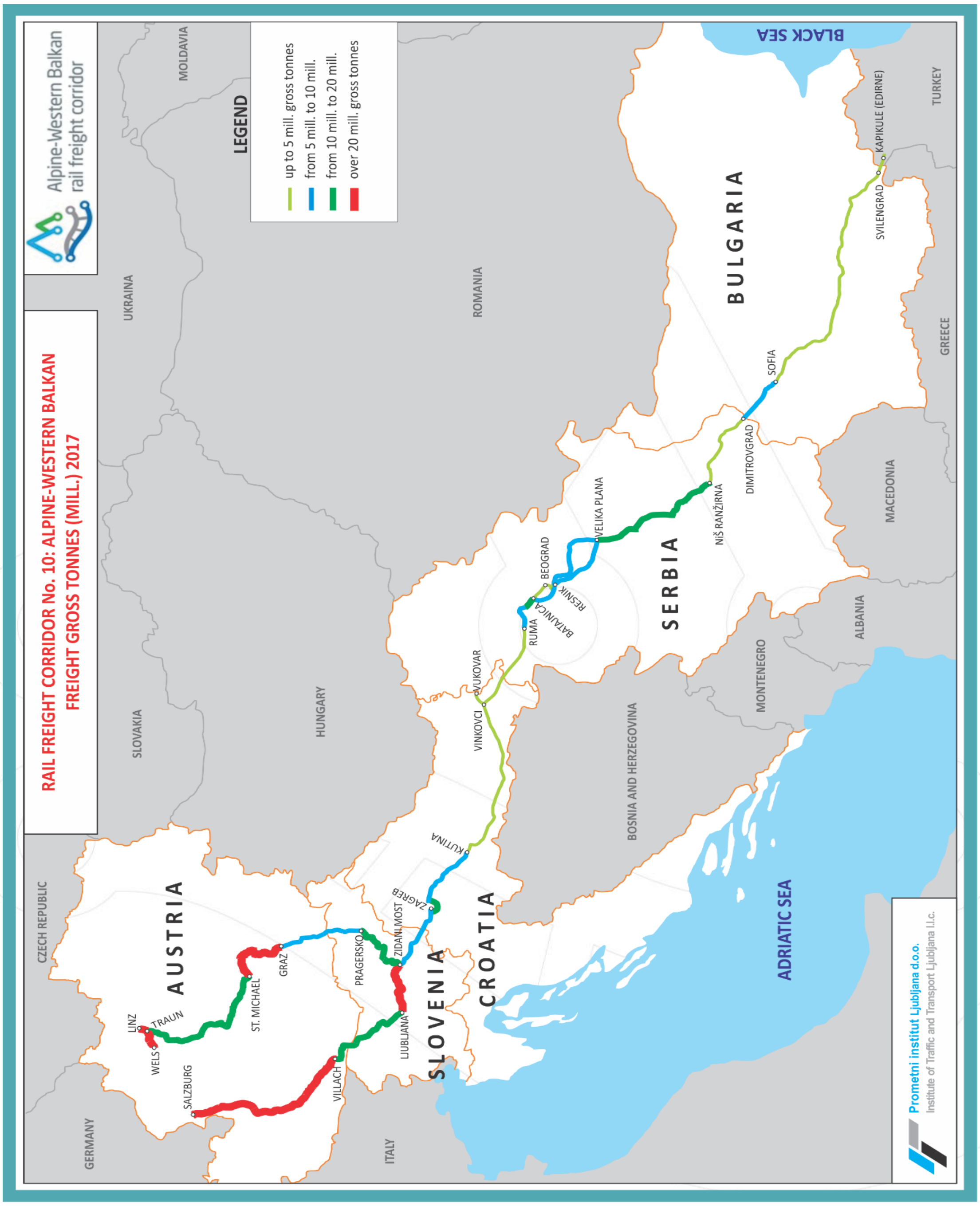
Figure 3.5.2-4: Volume of freight train km along the AWB RFC in 2017



Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

A total of 40 % of freight train km from the AWB RFC in 2017 was in Austria, 22 % in Serbia, 19 % in Slovenia, and 10 % or less in Croatia and Bulgaria.

Figure 3.5.2-5: Freight gross tonnes along the AWB RFC in 2017



3.5.3. Passenger volume

Passenger train kilometres refers to the number of train kilometres travelled by revenue earning passenger trains (international, regional, commuter). The following table and figure presents the volumes in 2016 and 2017.

Table 3.5.3-1: Passenger train kilometres along the AWB RFC in 2016 and 2017

State	AWB RFC: 1,000 pass. train km	
	2016	2017
Austria	11.630	12.069
Slovenia	5.999	5.840
Croatia	5.021	6.579
Serbia	3.739	4.030
Bulgaria	5.331	5.605
Total	**31.721**	**34.123**

Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

The volume of passenger train km on the AWB RFC increased by 7,6 % between 2016 and 2017.

The next table presents the share of passenger trail km on the AWB RFC compared to that on all the national railway networks.

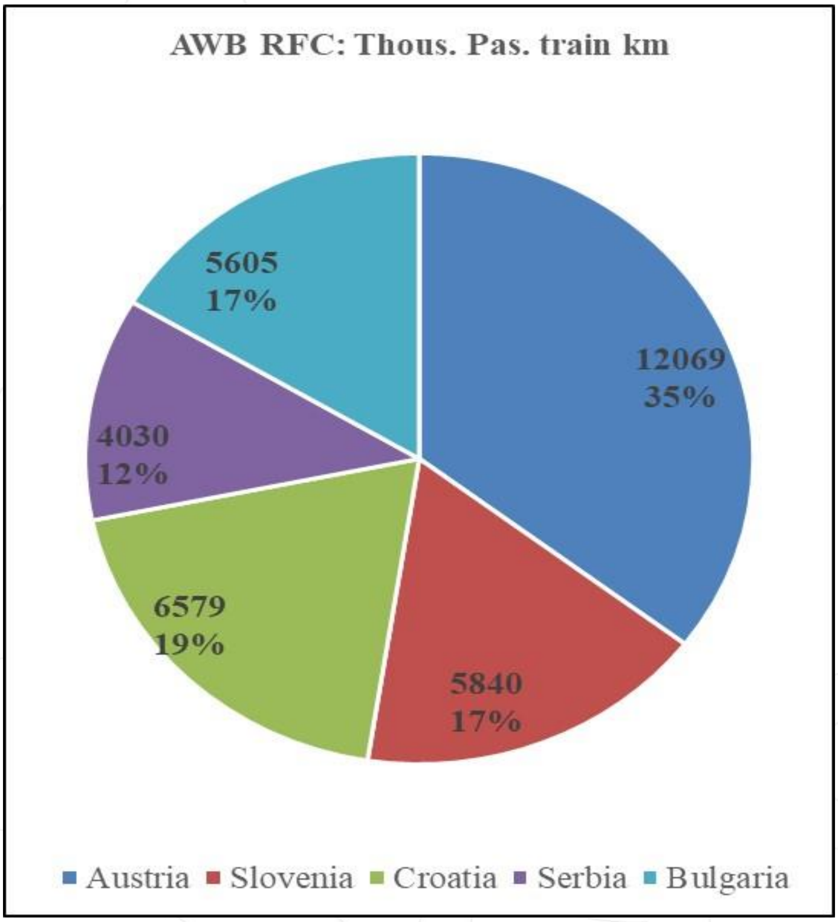
Table 3.5.3-2: Share of passenger train km on the AWB RFC compared to all the national rail networks

State	AWB RFC share of pass. train km	
	2016	2017
Austria	10 %	11 %
Slovenia	58 %	57 %
Croatia	33 %	43 %
Serbia	34 %	24 %
Bulgaria	25 %	28 %

Source: EUROSTAT and Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

The share of passenger train km on the AWB RFC in Austria, compared to the all the national rail network, is about 10 %. In Slovenia the share is just under than 60 % in Croatia about 40 % in Serbia about 30 %, and in Bulgaria less than 30 %.

Figure 3.5.3-1: Passenger train kilometres along the AWB RFC in 2017



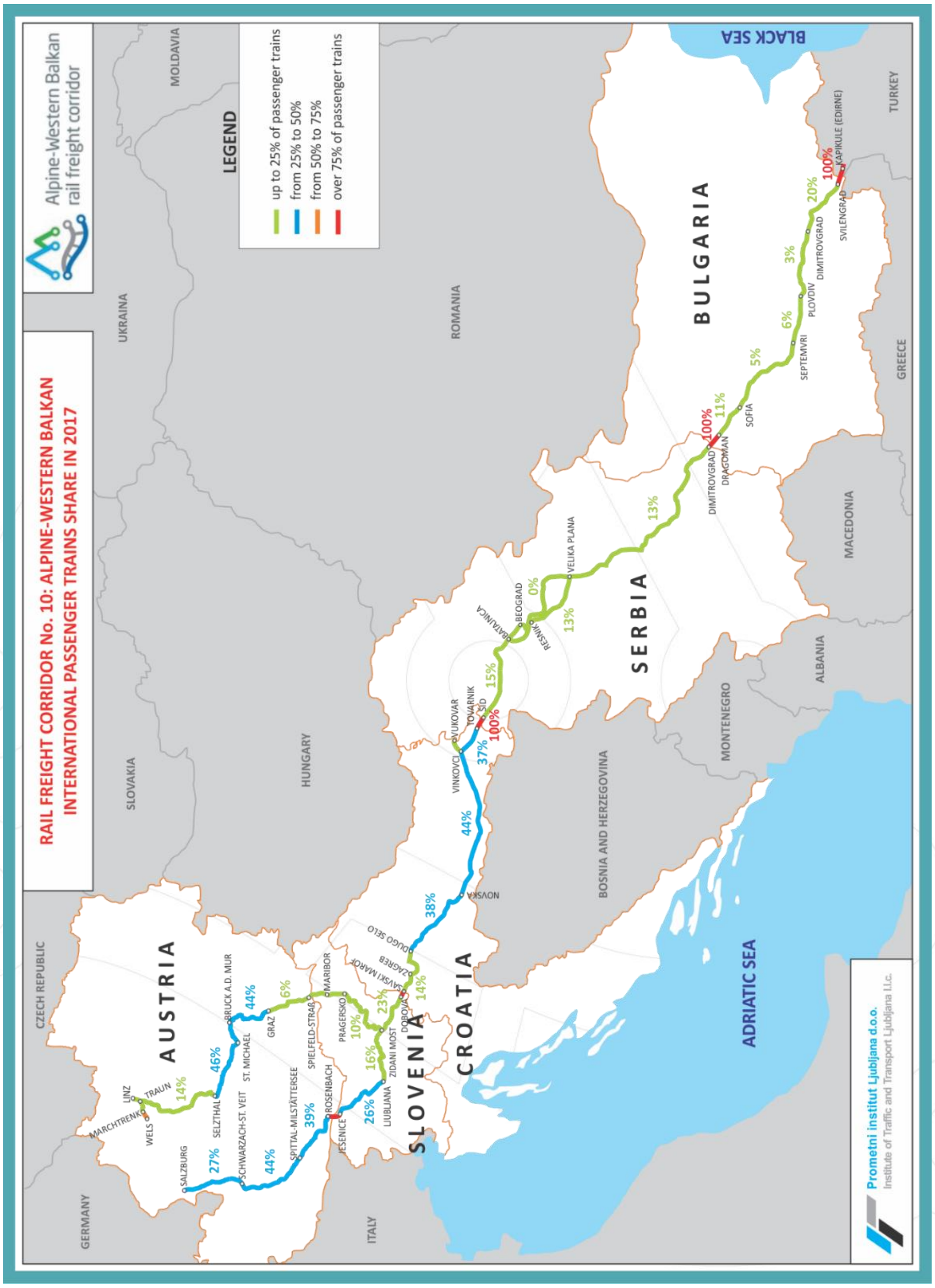
Source: Railway infrastructure managers – ÖBB, SŽI, HŽI, IŽS, NRIC.

A total of 35% of all passenger train km on the AWB RFC is accounted for by Austria. Slovenia, Croatia and Bulgaria have almost equal shares of just less than 20 %. Serbia has a share of 12 %.

The following figure presents the share accounted for by international passenger trains share along the AWB RFC in 2017 compared to all passenger trains. Only at cross border sections do international passenger trains account for 100 %. At other sections the share is under 50 %. The highest percentage taken by international passenger trains is seen for Austria and

Croatia, at up to 46 %. Bulgaria has the lowest share of international passenger trains, and those on the section Sofia-Dimitrovgrad do not exceed 6 %.

Figure 3.5.3-2: International passenger trains share of passenger train km along the AWB RFC in 2017


Alpine-Western Balkan
rail freight corridor
RAIL FREIGHT CORRIDOR No. 10: ALPINE-WESTERN BALKAN
INTERNATIONAL PASSENGER TRAINS SHARE IN 2017
LEGEND
up to 25% of passenger trains
from 25% to 50%
from 50% to 75%
over 75% of passenger trains
AUSTRIA
SLOVENIA
CROATIA
SERBIA
BULGARIA
CZECH REPUBLIC
GERMANY
SLOVAKIA
UKRAINA
MOLDAVIA
HUNGARY
ROMANIA
ITALY
BOSNIA AND HERZEGOVINA
MONTENEGRO
ALBANIA
MACEDONIA
GREECE
TURKEY
BLACK SEA
ADRIATIC SEA
SALZBURG
WELS
MARCHTRENK
LINZ
TRAUN
SELZTHAL
BRUCK A.D. MUR
ST. MICHAEL
GRAZ
SCHWARZACH-ST. VEIT
SPITTAL-MILLSTÄTTERSEE
ROSENBACH
JESENICE
SPIELFELD-STRAß
MARIBOR
PRAGERSKO
ZIDANI MOST
LJUBLJANA
DOBOVA
SAVSKI MAROF
ZAGREB
DUGO SELO
NOVSKA
VINKOVCI
VUKOVAR
TOVARNIK
ŠID
BATAJNICA
BEOGRAD
RESNIK
VELIKA PLANA
DIMITROVGRAD
DRAGOMAN
SOFIA
SEPTEMVRI
PLOVDIV
DIMITROVGRAD
SVILENGRAD
KAPIKULE (EDIRNE)
27%
14%
46%
44%
44%
6%
39%
10%
23%
16%
26%
14%
38%
44%
37%
100%
15%
0%
13%
13%
100%
11%
5%
6%
3%
20%
100%
Prometni institut Ljubljana d.o.o.
Institute of Traffic and Transport Ljubljana l.l.c.

3.5.4. Type of goods

Along the AWB RFC different types of goods are carried by different rail freight carriers. The most commonly carried types of goods are:

- containers
- vehicles
- coal
- iron, iron waste, iron ore
- cereals
- oil products, petrol, gasoline, diesel
- gas
- phosphates
- timber
- steel
- artificial fertiliser
- stone aggregate
- RO-LA trucks
- coke

3.5.5. Rail carriers

<u>Rail freight carriers</u>

<u>Rail freight carriers in Austria:</u>

- Rail Cargo Group (national carrier – ÖBB group)
- Adria Transport
- CargoServ
- ERS Railways
- LTE - Logistik und Transport GmbH
- Rail & Sea
- SETG- Salzburg Rail Transport Logistik
- Metrans
- CD Cargo
- GKB - Graz-Köflacher Bahn und Busbetrieb GmbH
- GCA - Grampetcargo Austria GmbH
- Ecco - Ecco Rail GmbH
- CargoServ - Voest Steelworks

Rail freight carriers in Slovenia:

- SŽ-Tovorni promet (national carrier – SŽ group)
- Rail Cargo Carrier, družba za železniški tovorni promet, d.o.o.
- Adria Transport
- InRail S.p.A.
- Ten Rail d.o.o.

Rail freight carriers in Croatia:

- HŽ Cargo (national carrier)
- ENNA Transport
- Rail Cargo Carrier – Croatia
- Rail & Sea
- SŽ - Tovorni promet
- Transagent Rail
- Train Hungary Maganvasut Ipari
- CER Cargo

Rail freight carriers in Serbia:

- Srbija Kargo (national carrier)
- Despotija
- Kombinovani prevoz
- Neo Cargo Logistic
- Eurorail Logistics

Rail freight carriers in Bulgaria:

- BDZ Cargo (national carrier)
- Bulgarian railway company
- Bulmarket Rail Cargo
- SE Transport Construction and Rehabilitation
- Rail Cargo Carrier - Bulgaria
- GASTRADE. S.A.
- Mini Maritsa Iztok EAD

- DB Cargo
- Express Service
- Cargo Trans Vagon
- Port Rail
- TBD-Tovarni prevozi
- PIMK Rail PLS
- DMV Cargo Rail

Major passenger rail carriers

- Austria: OBB-Personenverkehr AG
- Slovenia: SŽ-Potniški promet
- Croatia: HŽ Putnički prijevoz
- Serbia: SrbijaVoz
- Bulgaria: BDZ Passengers – BDZ PP

3.6. Rail Carrier demands

Railway freight carriers and their clients have many demands to improve rail transport along the AWB RFC, and these need to be met in order to further raise the competitiveness of rail transport compared to the other modes (road, sea,…). These demands relate to: travel time, traction system, axle load category, punctuality, safety, border crossing, speed restrictions, bottlenecks, train path allocation, intermodal terminals, just-in-time delivery, railway infrastructure charges, train's length, information and communication technologies (ICT).

3.7. Development of rail freight traffic and major trade flows along the AWB RFC

The AWB RFC route is the key rail axis in the Western Balkans region, both in terms of passengers and freight. A recent study by the International Bank for Reconstruction and

Development[7], estimates that rail freight flows reach 12,000 to 14,000 tonnes per day in the most heavily used sections, in the Zagreb and Belgrade areas. This is equivalent to about 3 to 5 million tonnes of freight per year[8].

The significant potential of the AWB RFC is underlined by the fact that prior to the dissolution of Yugoslavia – which ended the functioning of the corridor as a seamless transport axis – the volume of transit goods transported along this route was more than double the current figures: In 1989, approximately 18 million gross tonnes were shipped by rail along the corridor[9]. One of the key reasons for the decrease in volume is a shift of transit traffic to routes further north.

In terms of markets, AWB RFC AWB RFC will serve two geographically distinct submarkets:

- Transport related to the regions served by the AWB RFC, including:
  - transport between the regions directly served by the corridor and
  - transport between the region served by the corridor and other parts of Europe;
- Long-distance transport transiting the AWB RFC along its entire length between Austria and Bulgaria (possibilities for transit between Germany and Turkey).

In each of these markets there is significant potential to develop rail freight transport, either by shifting transport to rail from other modes (modal shift effect) or by developing overall transport volumes via the positive impact of transport improvements on regional economic development and trade (development and trade effect).

The key difference between these two markets is that the first is determined to a large extent by economic development of the region along the corridor, i.e. both modal shift and development/trade effects play a role here. For long-distance transport, the modal shift effect dominates.

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[7] IBRD (2015). The Regional Balkans Infrastructure Study (REBIS) Update, Report No. 100619-ECA, The International Bank for Reconstruction and Development, Washington DC, September 2015

[8] The study does not specify whether the daily volumes refer to 365 days per year or to workdays only (around 300 days).

[9] Source: SŽ-Infrastruktura

3.7.1. Regions served by the AWB RFC

Historic and current trade data suggest that trade flows and goods traffic among Slovenia, Croatia and Serbia are at a comparatively high level. The establishment of the AWB RFC can help to increase the market share of rail in this significant market. At the same time, there is significant growth potential for freight transport to and from Bulgaria to the other countries along the corridor.

Regarding trade and transport between the states of the AWB RFC and the rest of Europe, it is important to note that the EU is the dominant trading partner of the Western Balkan states. Roughly, three quarters of the trade volume of these countries, both in terms of exports and imports, is directed to EU member states, in particular to the core of the EU[10]. The AWB RFC establishes support for these trade relations by creating the conditions for competitive rail transport services, particularly to the economic core of Central and Western Europe and to the North Sea ports in Germany, the Netherlands and Belgium.

Significant growth potential could result from a convergence of the Western Balkan region towards income and productivity levels in Central and Western Europe. The level of economic activity in the countries covered by the AWB RFC is generally well below the average of the 28 EU member states (see the table below). Convergence towards EU levels would imply above-average GDP growth rates over long time periods.

Moreover, due to its close relation to economic activity, economic growth would be accompanied by significant growth in freight transport.

Indeed, economic growth in the Western Balkan states has significantly exceeded overall growth in the 28 EU member states in general and that of relevant higher-income countries such as Germany and Austria (see the table below). This pattern is expected to continue according to short-term economic forecasts.

[10] http://ec.europa.eu/trade/policy/countries-and-regions/regions/western-balkans/

Table 3.7.1-1: GDP per capita in the AWB RFC countries and growth rates

	2017 GDP		GDP growth (%) - prognosis	
	Euro per capita	Index EU=100	2019	2020
(1) AWB RFC countries				
Austria	41.900	128	2,0	1,7
Slovenia	19.600	85	3,4	2,8
Croatia	10.900	61	2,6	2,5
Serbia	4.800	37	3,5	4,0
Bulgaria	7.100	49	3,3	3,0
(2) EU 28 average, other relevant countries				
EU 28	29.000	100	2,1	1,8
Germany	38.400	124	1,8	1,6
Turkey	9.600	67	3,0	3,0

Source: International Monetary Fund, Eurostat.

Regarding the medium to longer term, a recent report by the European Bank for Reconstruction and Development estimates that despite challenges in the past there are positive signs for a convergence of the Western Balkans towards average EU levels in economic performance, which can intensify provided appropriate conditions are created. The study identifies stronger trade integration, both within the region and with the rest of the world, and an improvement in transport infrastructure and connectivity, as among the key potential growth drivers.

3.7.2. Long-distance transport transiting the AWB RFC

Regarding long-distance transport, the AWB RFC provides a natural link between Central Europe and Turkey (and beyond). It offers the shortest route from Central Europe to the Bulgarian/Turkish border and relatively favourable topographic characteristics, in particular for rail freight (with steep gradients limited to Alpine crossings in Austria and some short sections elsewhere).

3.7.2.1. Turkey-EU international trade

This subchapter provides a picture of the trade in goods between the EU and Turkey.

Overview:

- In 2016, Turkey was the 22nd largest exporter of goods in the world with a share of 1,2 % of world exports, and the 14th largest importer of goods with a share of 1,6 % of world imports.
- In 2017, among the EU's trading partners, Turkey was the fifth largest partner for exports of goods from the EU and the sixth largest partner for imports of goods to the EU.

- Manufactured goods make up 81 % of EU exports of goods to Turkey and 89 % of EU imports of goods from Turkey.
- In 2017, Germany was the EU’s largest importer of goods (14 billion EUR) and exporter of goods (22 billion EUR) with Turkey.
- Germany also had the largest trade in goods surplus (8 billion EUR) with Turkey, while Slovenia had the largest deficit (1,5 billion EUR).

3.7.2.2. China-EU international trade

This subchapter provides a picture of the international trade in goods between the EU and China.

Overview:

- In 2017, China was the largest exporter and the 3rd largest importer in the world.
- In 2018, China (11 %) was the 2nd largest partner for EU exports of goods and the largest partner for EU imports of goods (20 %).
- Among the EU member states, the Netherlands was the largest importer of goods from China and Germany was the largest exporter of goods to China in 2018.

3.8. Possibilities to shift cargo from road to rail

Many railway technologies make it possible to shift the cargo from road transport to rail transport. The cargo volume could be transported in containers, swap bodies or heavy goods vehicles.

Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (e.g., rail, ship, and truck), without any handling of the freight itself when changing modes.

Combined transport is a form of intermodal transport, which is the movement of goods in one and the same loading unit or road vehicle, using two or more modes of transport successively without handling the goods while changing modes. Combined transport is intermodal transport where the major part of the journey is by rail, inland waterway or sea, and any initial and/or final legs carried out by road are as short as possible

European combined transport saw a year of robust growth in 2017: the total number of consignments transported by UIRR operator members increased by +5,5 %, whereas output when expressed in tonne-kilometres grew by +8,7 %. Cross-border services expanded by +8,83 %, while domestic services grew by +7,93 %. Within the cross-border relations, the extra-EU – transcontinental – services expanded by 38 %, while intra-European traffic saw +5 % growth[11].

[11] Source: UIRR Report: European road-rail combined transport 2017 – 2018.

Table 3.8-1: EU combined transport volume in the years 2016 and 2017

	Cross-border			Domestic			Total		
	2016	2017	2017/2016	2016	2017	2017/2016	2016	2017	2017/2016
Number of consignments	2,075,709	2,153,563	3.75%	949,151	1,037,008	9.26%	3,024,860	3,190,571	5.48%
containers	1,559,213	1,651,506	5.92%	860,373	954,711	10.96%	2,419,586	2,606,217	7.71%
(craneable) semi-trailers	391,389	372,826	-4.01%	79,146	73,453	-7.19%	470,535	446,279	-5.15%
complete trucks (RoLa)	125,107	129,231	3.30%	9,632	8,844	-8.18%	134,739	138,075	2.48%
Average distance	1,067	1,120	5.00%	491	492	0.20%	878	944	7.48%
Billion tkm	50.26	54.70	8.83%	8.70	9.39	7.93%	58,96	64.09	8.70%
Number of TEU	4,151,418	4,307,126	3.75%	1,898,301	2,074,015	9.26%	6,049,719	6,381,141	5.48%

Source: UIRR Report: European road-rail combined transport 2017-18.

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	2016	2017	2017/2016	2016	2017	2017/2016	2016	2017	2017/2016
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Number of TEU	4,151,418	4,307,126	3.75%	1,898,301	2,074,015	9.26%	6,049,719	6,381,141	5.48%

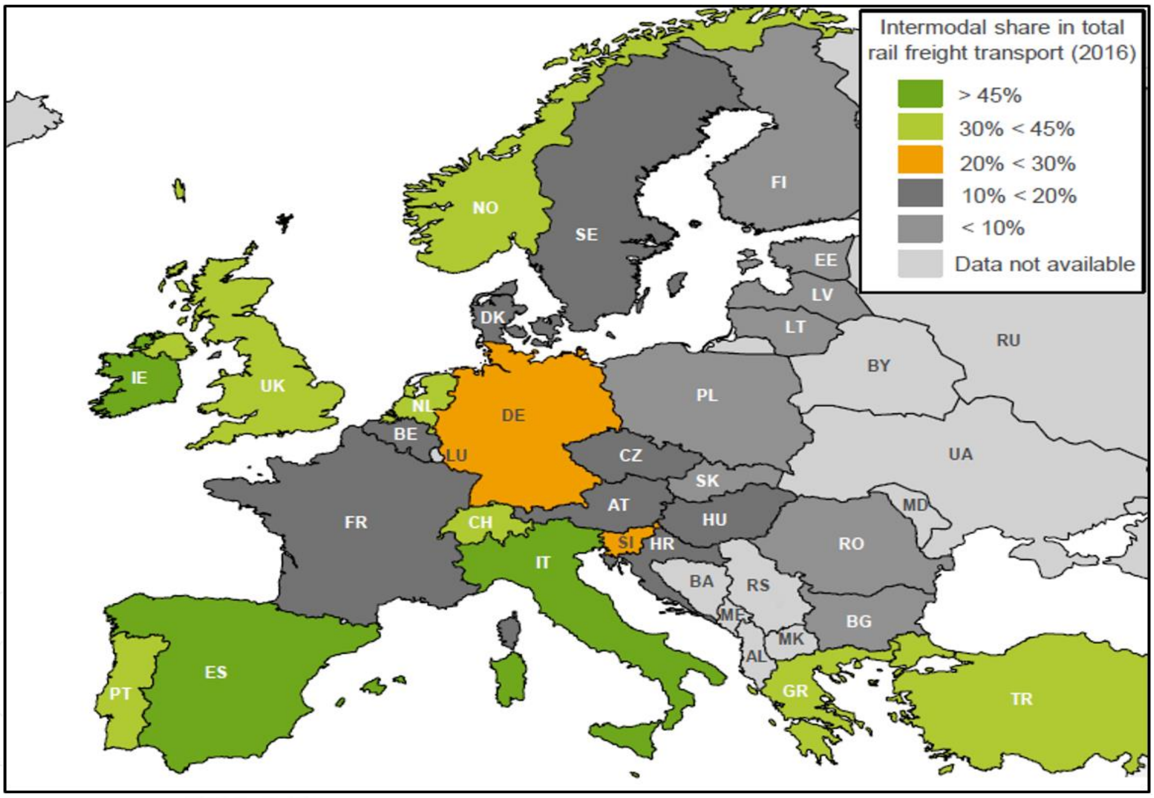
The transport of complete trucks, or Ro-La (accompanied combined transport), once over 12 % of total combined transport traffic, has halved in its weight, while the proportion of consignments utilising a craneable semi-trailer increased to about 14 % by 2017. The proportion of containers and swap bodies continues to grow, with about 82 % of all UIRR consignments.

The most important routes of unaccompanied combined transport are the ones connecting Northwest Europe with South Europe (transalpine corridors with more than 50 % of the total volume). Ro-La is focused on transalpine routes. Traffic is dynamically developing based on Western-Eastern relations, and even more within the Eastern countries and along the intercontinental routes towards China, Russia and Turkey[12].

The next figure shows the intermodal share of railway transport in Europe.

[12] Source: UIRR Report: European road-rail combined transport 2017-18

Figure 3.8-1: Intermodal share of rail freight transport in Europe



Source: Eurostat (2018), last database update by Eurostat: November 14, 2018, BSL Transportation analysis, modified by Prometni Institut Ljubljana, d.o.o.

The highest share of rail intermodal transport on the AWB RFC route is seen in Slovenia, with 20 – 30 % of all freight transport.

3.8.1. General conditions to shift cargo from radroad to rail

The promotion of more efficient and sustainable methods of transport, and in particular of rail freight, has been a key part of EU policy for the last 25 years. As early as 1992, the European Commission set shifting the balance between modes of transport as one of its main objectives. In 2001, the European Commission confirmed the importance of revitalising railways, setting the objective of maintaining the market share of the rail freight sector in Central and Eastern European member states at 35 % by 2010. Finally, in 2011, the Commission set a target of shifting as much as 30 % of road freight transported over distances greater than 300 km to other modes of transport, such as rail or waterborne transport, by 2030, and more than 50 % by 2050.[13]

Every day thousands of tonnes of goods are transported across the Europe to factories, warehouses or final customers. Rail freight (and combined rail–road transport) is in direct competition with road haulage: shippers regularly compare the two when deciding which mode of transport to use. They naturally choose the one which best suits their needs, mainly taking into account: reliability, price, customer service, frequency and transport time. Risk of loss and damage, flexibility and environmental impact are also taken into consideration. In other words, shippers choose methods of transport on the basis of business criteria, and not on the basis of EU policy priorities.[14]

Some products, such as raw materials, are by nature more suitable for transporting by rail. However, to be competitive with road transport for other types of good, the rail sector faces several challenges which have an impact on shippers' choice, such as timetable, access charges or punctuality.

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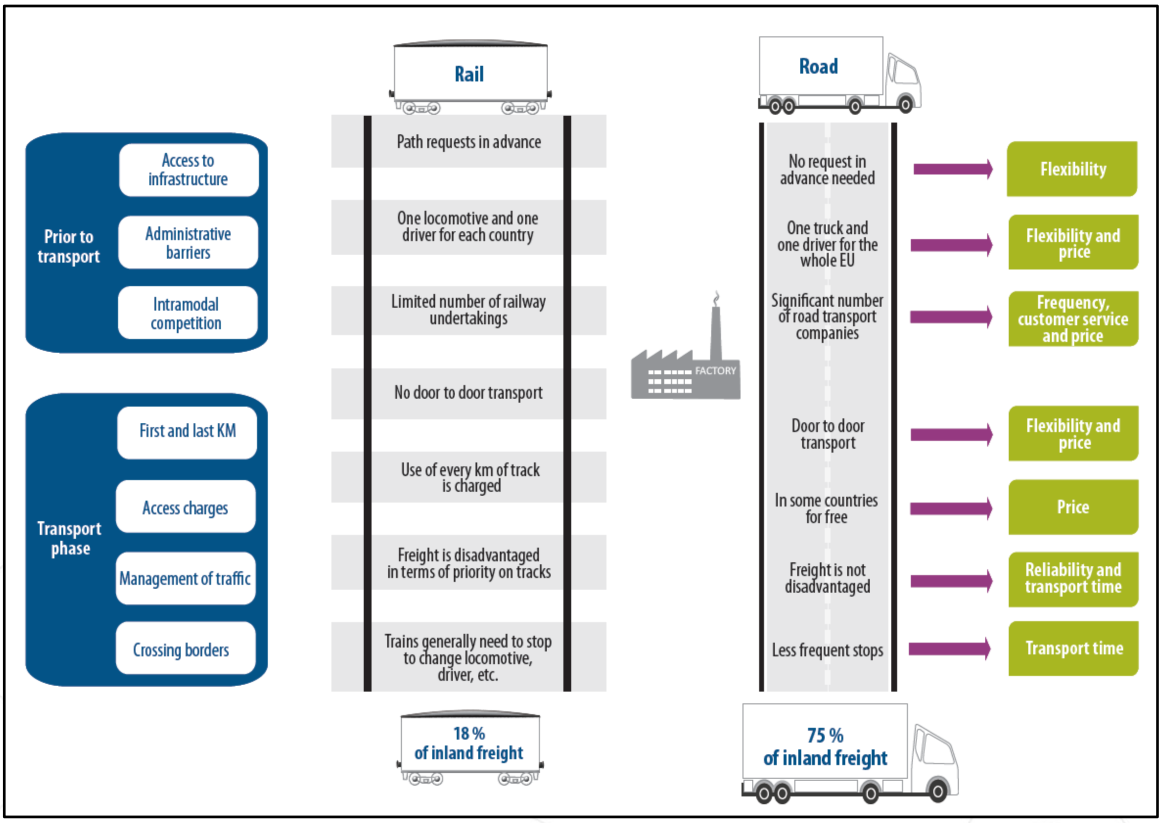
[13] Source: Rail freight transport in the EU: still not on the right track, Special Report, European Court Of Auditors, 2016

[14] European Intermodal Association, Intermodal yearbook 2011 and 2012

Figure 3.8.1-1: Comparison of some of the challenges faced by rail freight transport compared to road



Source: European Court of Auditors

The main condition to shift cargo from road to rail is the available rail and road infrastructure.

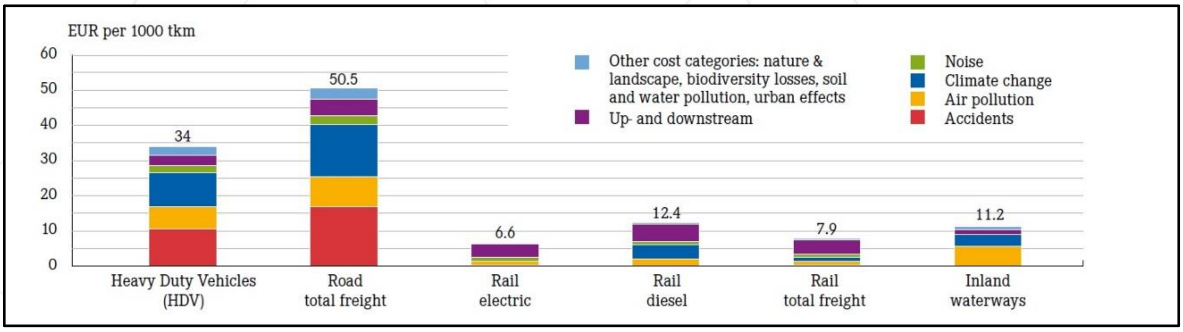
The poor performance of rail freight transport in terms of volume and modal share in the EU is not helped by the average commercial speed of freight trains. Simply put, freight trains run slowly and their speed has not significantly increased over the last decade.

If railway transport could provide shorter travel times on a route compared to road transport, then it has the potential to encourage a shift in goods from road to rail. Travel times on the railway will be reduced with the aid of ongoing and future infrastructure and rolling stock projects.

In many different calculations, the real costs of freight traffic often remain hidden. This is because the external costs of road transport are usually ignored: these are the true costs incurred by transport, which are not supported and paid for by individual transport users but are borne by society as a whole. There are many external costs as a result of transport activity – the major ones include the impact on climate change, air pollution, accident costs, congestion, and noise, along with smaller but not insignificant issues such as ecosystem loss, soil and water pollution, and biodiversity loss.[15]

As shown in the figure below, the average external costs for road transport (using a heavy goods vehicle – HGV) are more than four times higher than rail for freight.

Figure 3.8.1-2: Average external costs for freight transport in EU member states



Source: CER & UIC, Greening transport: reduce external costs, April 2012

If the external costs would be included in the total transport price, paid by the end users, then railway transport could be much more competitive and cheaper. The EU and AWB RFC member states should support green rail freight transport, charging the negative external costs of transport.

An example of external costs has been calculated for transportation of 1.000 tonnes by road and rail between Istanbul and Munchen for a distance of 2.013 kilometres. The costs for trucks are 34 EUR/1.000 tkm, while those for rail are 6,6 EUR/1000 tkm (graph above).

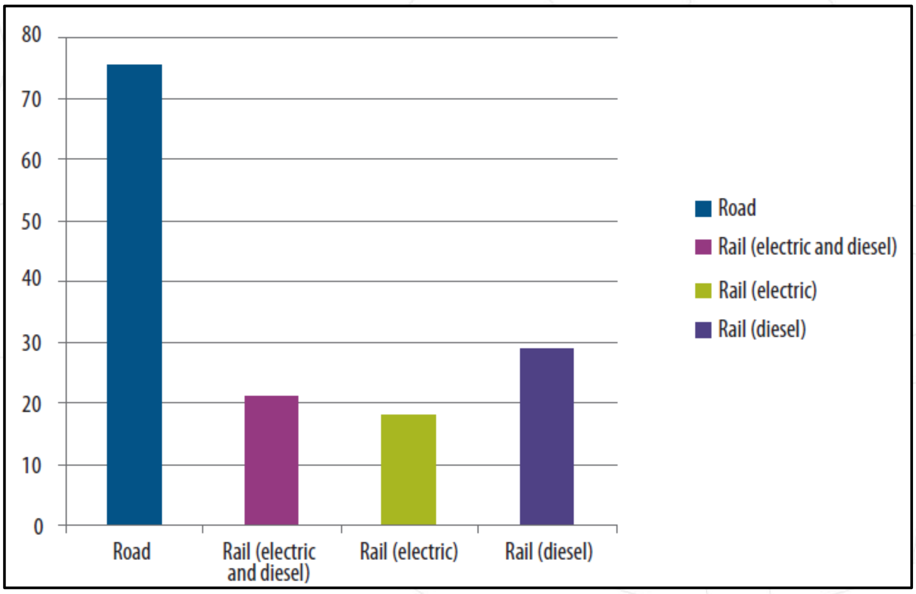
[15] Source: CER & UIC, Greening transport: reduce external costs, April 2012

- External costs for road transport: 68.442 EUR
- External costs for rail transport: 13.286 EUR

The external costs for transportation of 1.000 tones between Turkey and Germany by road are five times higher than the railway external costs. Railway transport is thus the most appropriate transport for long land distances.

Transport also has a negative impact on the environment and quality of life. It accounts for around one third of energy consumption and total CO_2 emissions in the EU. Promoting efficient and sustainable methods of transport, such as rail and inland waterways over roads, could also help lower Europe's dependence on imported oil and reduce pollution. According to the European Environment Agency, CO_2 emissions from rail transport are 3,5 times lower per tonne-kilometre than those from road transport.

Figure 3.8.1-3: CO2 emissions per tonne-kilometre in the EU in 2012



Source: European Court of Auditors based on European Environment Agency data.

3.9. Prognosis of transport performance develoment

The demand for rail services is best depicted by the railway infrastructure transport performance indicators. Infrastructure, service quality and external cost indicators reflect both the increasing and decreasing trends in transport performances. For the purposes of defining the AWB RFC objectives and strategy it is necessary to analyze and understand the development of transport performances which has been captured by two scenario prognosis: scenario 1 (optimistic) and scenario 2 (realistic).

The first scenario is provisionally referred to as the “high growth rate” one. With this it is expected that the major transport infrastructure projects will be successfully completed. The forecasts of global financial institutions for higher growth between 2018 and 2023 have been taken into account as well.

The second scenario is based on a “stable growth rate” assumption, and represents the baseline scenario for transport, based on the GDP growth forecast in period 2018 – 2023.

Both scenarios comply with the European transport policy key recommendation that transport must develop at a lower growth rate compared to GDP, which is reasonable from an economic perspective.

The tendency for the predominance of road transport in terms of goods carried, both internationally and domestically, has been preserved. Railway transport has good prospects in terms of international traffic, predominantly transit traffic, while maritime and inland waterway transport remain at a relatively low capacity, mainly in the field of international transport. A decisive change in the redistribution among transport modes and reducing the share of road transport may only be achieved with the accelerated development of intermodal transport.

In freight, and in terms of the impact of external factors, intermodal transport, which combines the advantages of railway, waterborne and road transport, has the best chances for development. A higher growth rate of freight transport compared to passenger transport is foreseen in both scenarios. This is determined by assumptions for the successful implementation of infrastructure projects, which will contribute to the development of a modern transport network, competitive to transport systems in the developed European states, on the one hand, and expectations for the faster growth of industrial and agricultural production, which will increase transport demand – on the other.

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

The following tables show two forecast scenarios for the AWB RFC for period 2019 – 2030, separated by railway infrastructure managers. Transport forecast for passenger transport is available for train-kilometre units and passenger trains, and forecast for freight transport is available in gross tonnes kilometres and gross tonnes.

Table 3.9-1: Transport forecast AWB RFC – Scenario 1

RIM	Transport	Unit	2019	2020	2021	2024	2025	2027	2030
ÖBB-Infra	passenger	train-km (thous.)	12.575	12.836	13.102	13.820	13.992	14.343	14.702
		trains	23.861	24.356	24.861	26.224	26.551	27.215	27.898
	freight	gross tkm (mill.)	11.017	11.474	11.950	13.284	13.614	14.300	15.024
		gross tonnes (thous.)	20.906	21.772	22.675	25.207	25.834	27.135	28.508
SŽ-I	passenger	train-km (thous.)	6.139	6.295	6.455	6.889	6.994	7.209	7.430
		trains	20.854	21.383	21.925	23.402	23.758	24.486	25.239
	freight	gross tkm (mill.)	4.642	4.877	5.125	5.830	6.007	6.378	6.774
		gross tonnes (thous.)	15.767	16.567	17.407	19.802	20.405	21.665	23.011
HŽ-I	passenger	train-km (thous.)	6.816	6.937	7.061	7.394	7.473	7.634	7.799
		trains	19.042	19.382	19.728	20.658	20.879	21.328	21.788

	freight	gross tkm (mill.)	1.845	1.911	1.979	2.168	2.214	2.310	2.411
		gross tonnes (thous.)	5.154	5.338	5.528	6.057	6.187	6.455	6.735
IŽS	passenger	train-km (thous.)	4.325	4.480	4.640	5.086	5.195	5.421	5.658
		trains	7.197	7.455	7.722	8.464	8.646	9.022	9.416
	freight	gross tkm (mill.)	4.828	5.174	5.545	6.643	6.929	7.538	8.205
		gross tonnes (thous.)	8.035	8.611	9.228	11.055	11.531	12.544	13.655
NRIC	passenger	train-km (thous.)	5.877	6.017	6.161	6.552	6.646	6.838	7.036
		trains	15.823	16.201	16.589	17.641	17.894	18.411	18.944
	freight	gross tkm (mill.)	1.476	1.547	1.621	1.830	1.883	1.992	2.109
		gross tonnes (thous.)	3.974	4.165	4.364	4.928	5.070	5.365	5.679
Total AWB RFC	**passenger**	**train-km (thous.)**	**35.731**	**36.565**	**37.419**	**39.741**	**40.301**	**41.444**	**42.625**
		trains	**16.607**	**16.994**	**17.391**	**18.470**	**18.730**	**19.262**	**19.811**
	freight	**gross tkm (mill.)**	**23.808**	**24.983**	**26.219**	**29.755**	**30.648**	**32.519**	**34.523**
		gross tonnes (thous.)	**11.065**	**11.611**	**12.186**	**13.829**	**14.244**	**15.114**	**16.045**

Scenario 1 is an optimistic scenario with the average yearly growth of 3,67 % between the years 2019 – 2030 for freight transport. In passenger transport the average yearly growth is 1,72 %.

Table 3.9-2: Transport forecast AWB RFC – Scenario 2

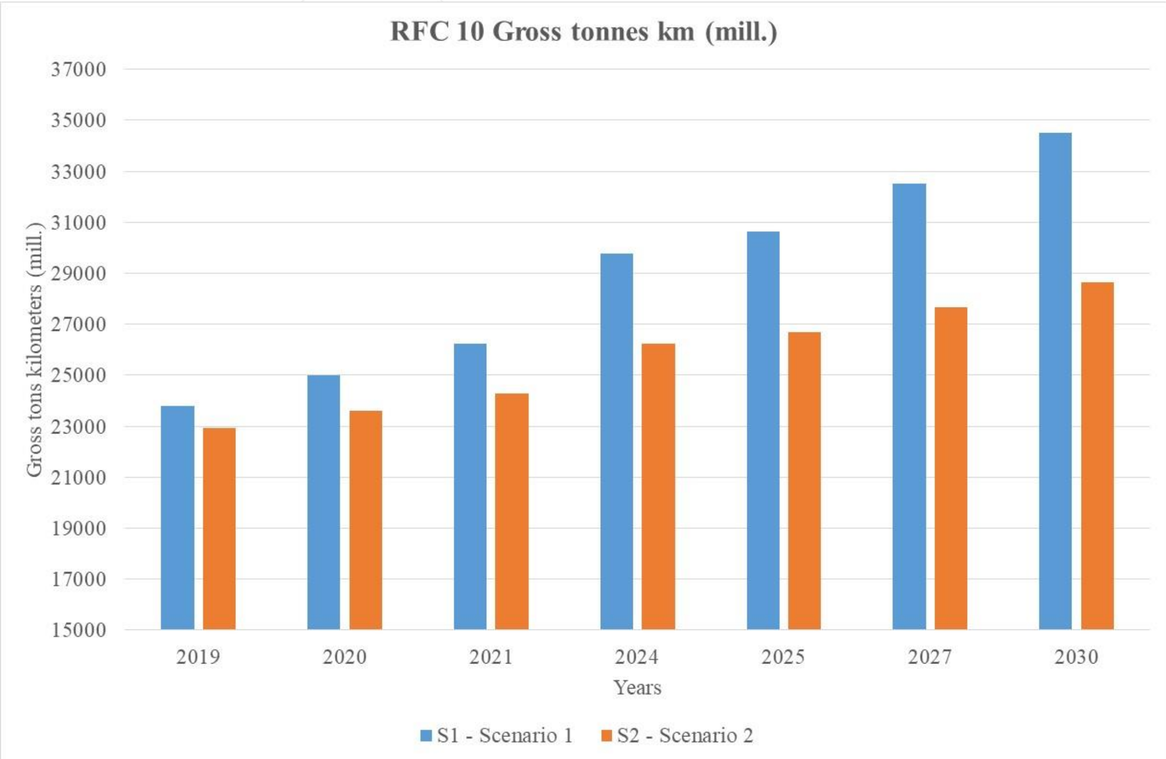
RIM	Transport	Unit	2019	2020	2021	2024	2025	2027	2030
ÖBB-Infra	passenger	train-km (thous.)	12.371	12.525	12.681	13.095	13.193	13.391	13.592
		trains	23.475	23.767	24.063	24.849	25.035	25.410	25.791
	freight	gross tkm (mill.)	10.669	10.935	11.207	11.947	12.125	12.490	12.867
		gross tonnes (thous.)	20.245	20.749	21.265	22.670	23.008	23.700	24.415
SŽ-I	passenger	train-km (thous.)	6.019	6.110	6.203	6.452	6.510	6.630	6.752
		trains	20.443	20.754	21.070	21.914	22.114	22.520	22.934
	freight	gross tkm (mill.)	4.464	4.600	4.740	5.125	5.219	5.411	5.611
		gross tonnes (thous.)	15.165	15.626	16.101	17.408	17.726	18.379	19.058
HŽ-I	passenger	train-km (thous.)	6.720	6.792	6.865	7.058	7.103	7.195	7.288
		trains	18.776	18.977	19.180	19.719	19.846	20.102	20.361
	freight	gross tkm (mill.)	1.794	1.833	1.872	1.978	2.003	2.055	2.109

		gross tonnes (thous.)	5.013	5.120	5.230	5.526	5.597	5.742	5.891
IŽS	passenger	train-km (thous.)	4.206	4.296	4.388	4.638	4.698	4.820	4.946
		trains	6.999	7.149	7.303	7.719	7.819	8.022	8.231
	freight	gross tkm (mill.)	4.573	4.770	4.975	5.552	5.695	5.993	6.308
		gross tonnes (thous.)	7.611	7.938	8.279	9.240	9.478	9.974	10.498
NRIC	passenger	train-km (thous.)	5.767	5.850	5.934	6.158	6.211	6.318	6.428
		trains	15.529	15.752	15.977	16.581	16.723	17.012	17.307
	freight	gross tkm (mill.)	1.423	1.464	1.506	1.621	1.648	1.706	1.765
		gross tonnes (thous.)	3.831	3.941	4.054	4.363	4.439	4.593	4.753
Total AWB RFC	**passenger**	**train-km (thous.)**	**35.083**	**35.574**	**36.072**	**37.402**	**37.716**	**38.355**	**39.005**
		trains	**16.305**	**16.533**	**16.765**	**17.383**	**17.529**	**17.826**	**18.128**
	freight	**gross tkm (mill.)**	**22.924**	**23.601**	**24.299**	**26.223**	**26.691**	**27.655**	**28.659**
		gross tonnes (thous.)	**10.654**	**10.969**	**11.293**	**12.187**	**12.405**	**12.853**	**13.320**

Scenario 2 is a realistic scenario with the average yearly growth at 2,19 % between the years 2019 – 2030 for freight transport. In passenger transport, the average yearly growth is 1,03 %.

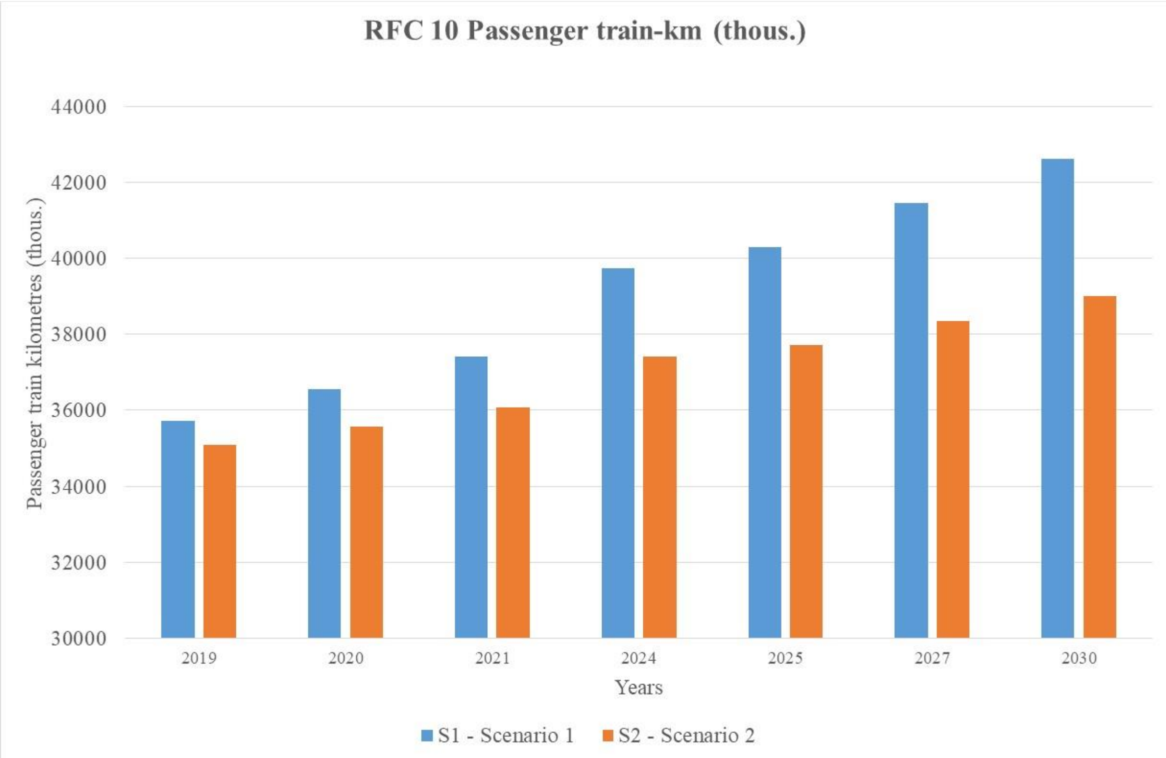
The following figures show the overall prognosis of the development of rail freight and passenger transport performances along the AWB RFC for all states together for both scenarios.

Figure 3.9-1: Transport forecast AWB RFC – Gross tonnes km (mill.)



Freight transport is presented via gross tonne kilometres. Scenario 1 is the optimistic scenario with the average yearly growth at 3,67 %. Scenario 2 is the realistic scenario with the average yearly growth at 2,19 %.

Figure 3.9.-2: Transport forecast AWB RFC – Passenger train km



Passenger transport is presented via passenger-train kilometres. Scenario 1 is an optimistic scenario with the average yearly growth at 1,72 %. Scenario 2 is a realistic scenario with the average yearly growth at 1,03 %.

Transport forecast conclusions:

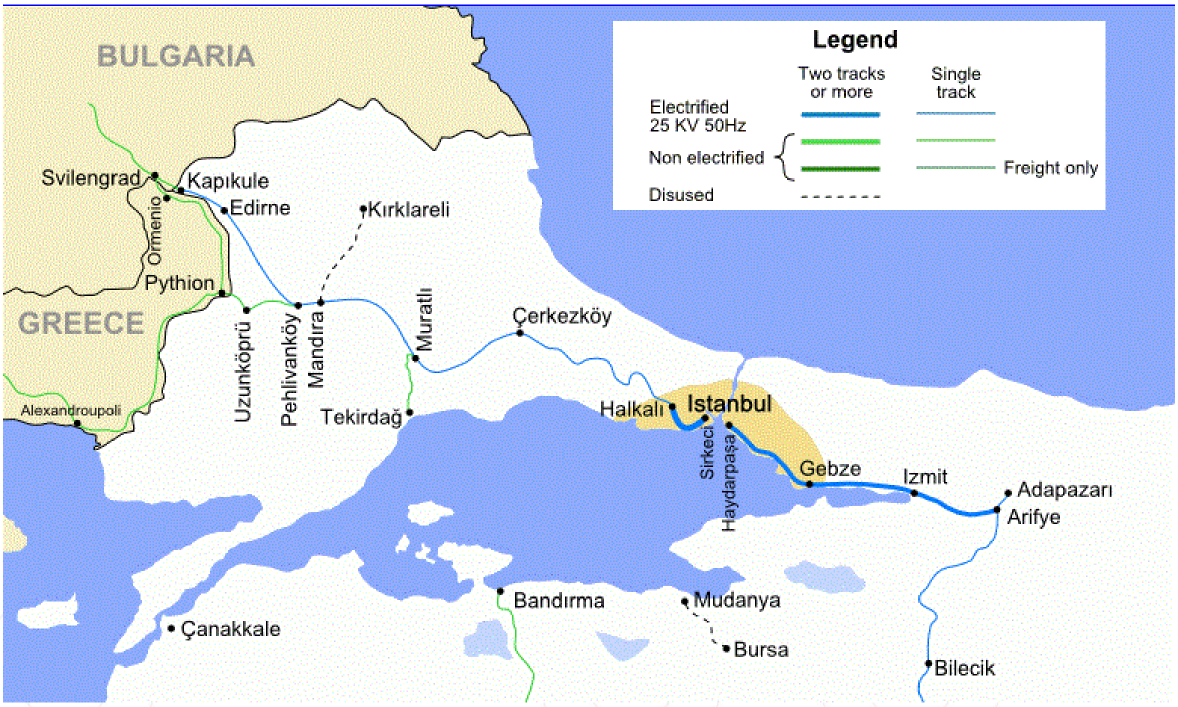
- Higher increase in rail freight transport performances on the lines included in the AWB RFC,
- General increase in rail passenger transport performances (but lower than in freight transport),
- Increase in transport performances and resulting savings in negative social costs generated by transport,

- Increased demands on capacity and technical parameters of lines included in the AWB RFC,
- Requirements for modernisation, reconstruction and optimisation of the AWB RFC,
- Requirement to meet the technical specifications for interoperability in rail passenger and freight transport,
- Pressure for 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.

3.9.1. Turkish rail network

The rail network on the European part of Turkey consists of a railway line from the border BG/TR-Kapikule to Halkali in Istanbul. The railway line Kapikule-Halkali (Istanbul) is a single track line with a standard gauge 1.435 mm and electrified with 25 kV. The line is 278 km long.

Figure 3.9.1-1: Rail network in Turkey on the route Svilengrad-Istanbul



Source: http://www.bueker.net/trainspotting/map.php?file=maps/turkey/turkey.gif

Logistic terminals

A logistic terminal at Istanbul/Halkali was opened in 2013, with a capacity of 2 million tons/year and area of 220.000 m^2. The closest seaport is Ambarli (distance 10 km). In the last year about 0,5 million tonnes were carried by rail.

The logistic terminal at Istanbul/Avrupa Yakası is in a phase of ongoing project studies and tender processes, and will be finished in the near future.

Future plans for the route Svilengrad-Istanbul/Halkalı-Kapıkule (230 km)[16]

Turkey has announced plans for building a new high speed railway line from Halkalı, Istanbul all the way to Kapıkule, Edirne-Turkey's border crossing with Bulgaria. The Halkalı-Kapıkule High-Speed Train Project will connect Turkey's high-speed train network with Europe's, and will connect the Iron Silk Road route's Turkish part with Europe. The old line will be used for freight transport.

3.10. Future investments on ON AWB RFC

Every member state of the AWB RFC has plans to upgrade the existing railway sections of the corridor, with some of the plans already in progress. The overview of railway infrastructure investments along AWB RFC by countries is presented in the below tables.

Table 3.10-1: AWB RFC planned investments in Austria

Section/Station	Description	Period	EUR (mill)
Linz-Wels	Four-track expansion; the project includes the construction of two lines that will complement the two existing lines	N/A	430
Bruck an der Mur-Graz	Upgrade of existing double track line Bruck an der Mur - Graz, increase of capacity until traffic starts on the new Koralm line, modernisation of railway stations	2015-2030	219
Graz-Klagenfurt	Construction of new line between Graz and Klagenfurt with a maximum speed 230km/h and max slope 10‰	20232026	5.367
Graz-Werndorf	Upgrade between the Station Graz and the Station Werndorf, increase of capacity (partly construction of third and fourth track)	2016-2023	112

[16] Source: Turkish State Railways - TCDD Annual report for 2017 and https://www.dailysabah.com/business/2018/07/18/new-high-speed-halkali-kapikule-railway-line-to-be-built-in-northwest-turkey

Werndorf-Border AT/SL	Upgrade of existing single/double track line, maximum speed up to 160km/h, construction of second track	Not fixed	570
Bruck an der Mur-Border AT/SL	Upgrade to ERTMS level 2	Not fixed	190

Source: OeBB infrastrktur

Table 3.10-2: AWB RFC planned investments in Slovenia

Section/Station	Description	Period	EUR (mill)
Jesenice-border-Rosenbach (AT)	Security-technical upgrading of the railway tunnel Karavanke	2020-2021	115 SI-50
Kranj-Jesenice	Upgrade of line, stations and stop points	N/A	N/A
Maribor-Šentilj, Stations Maribor, Mb. Tezno, Pesnica, Šentilj	Upgrade of axle load category, track extensions, increase speed and capacity, new signal-safety devices, improve electric supply, new platforms and accesses	2018-2022	254
Pragersko	Upgrade of axle load category, track extensions, increase speed and capacity, new signal-safety devices, improve electric supply, new platforms and accesses	2019-2020	89
Zidani Most-Celje Rimske Toplice, Laško-Celje	Upgrade of axle load category, track extensions, increase speed and capacity, new signal-safety devices, improve electric supply, new platforms and accesses	2016-2020	282
Zidani Most-Šentilj (All stations on the section)	Upgrading signal safety devices, remote traffic control	N/A	N/A
Pragersko-Maribor-Šentilj; Dobova-Zidani Most	ETCS Level 1 implementation	2017-2023	19

Source: http://www.krajsamorazdalje.si/

Table 3.10-3: AWB RFC planned investments in Croatia

Section/Station	Description	Period	EUR (mill)
Zagreb Gk-Savski Marof	Renewal of tracks, Bottleneck relief Public procurement in progress	2019-2021	63
Vinkovci-Vukovar	Upgrade and electrification of line and stations, new signal safety devices*	2019-2021	90
Dugo Selo-Novska	Preparation of the design and documentation for the reconstruction and modernisation and second track – phases 1, 2, 3	After 2022	550
Okučani-Vinkovci	Reconstruction of the existing track by building a second one, reconstruction of the stations according to the interoperability requirements Preparation of design documentation for the reconstruction	After 2022	11 (documentation only)
Zagreb Zapadni kolodvor-Zagreb Klara-Zagreb ranžirni-Zagreb Resnik-Sesvete-Dugo Selo	Reconstruction of the existing railway sections. Reconstruction of the stations according to the interoperability requirements	Ongoing projects 2018-2019	N/A

*EU allows exceptions regarding the usable track length
Source: HŽ-Infrastruktura, http://www.hzinfra.hr

Table 3.10-4: AWB RFC planned investments in Serbia

Section/Station	Description	Period	EUR (mill)
Border-Šid-Golubinci (81 km)	Reconstruction and modernisation of the existing double track line for a speed up to 160 km/h	2023-2027	250
Stara Pazova-Beograd Centar (34,5 km)	Reconstruction and modernisation of the existing double track line for a speed up to 200 km/h	2018-2021	,4314,8
Beograd (Batajnica)	New intermodal terminal	2020-2022	15,54
Ostružnica-Beograd Ranž. (20 km)	Second track on the bypass line Beograd Ranžirna-Ostružnica-Surčin-Batajnica for a speed up to 1620 km/h	2021-2023	52
Beograd Ranžirna	Station reconstruction with a container terminal	2020-2020	5,5[17]
Jajinci-Mala Krsna (60 km)	Reconstruction of existing single track line for speed up to 120 km/h	2019-2020	N/A
Resnik-Velika Plana (84 km)	Reconstruction and modernisation of the Resnik-Resnik - Velika Plana railway line with construction of the second track for a speed up to 160 km/h	2021-2026	340
Velika Plana-Niš (111 km)	Reconstruction and modernisation of the existing double track line Velika Plana-Nis for a speed of 160 km/h	2022-2027	562,5
Stalać-Đunis (17,5 km)	Reconstruction and modernisation, construction of the second track on section Stalać-Đunis for a speed up to 160 km/h	2021-2025	157
Niš-Dimitrovgrad (96 km)	Reconstruction and modernisation with electrification: • Construction of Niš bypass (22 km) for a speed up to 160 km/h • Reconstruction and modernisation of railway section Sicevo-Dimitrovgrad (80 km) for a speed up to 120 km/h • Niš-Dimitrovgrad Railway line electrification (86 km)	2020-2023	268

Source: Infrastruktura železnice Srbije, Ministry of Construction, Transport and Infrastructure of Serbia

[17] For Phase 1A has been secured the funds and the contract was signed with Contractor

Table 3.10-5: AWB RFC plan investments in Bulgaria

Section/Station	Description	Period	EUR (mill)
Voluyak Dragoman-Serbian border	Modernisation of the 49.5 km Voluyak Dragoman-Serbian border line, identified by the EU Council as a priority cross-border section	N/A	132
Sofia Railway Junction: Sofia-Voluyak	Development of Sofia Railway Junction: Sofia-Voluyak Railway Section	ongoing-2020	104
Sofia-Elin Pelin	Modernisation of the railway section Sofia-Elin Pelin	ongoing-2020	68
Elin Pelin-Kostenets*	Modernisation of the railway section Elin Pelin-Kostenets	ongoing-2020	524
Kostenets-Septemvri	Modernisation of the railway section Kostenets-Septemvri	ongoing-2020	178
Plovdiv	Development of Plovdiv railway node	ongoing-2020	103

*Modernised under the Operational Programme "Transport and transport infrastructure" 2014-2020.
Source: Connecting Europe Facility (CEF) – Transport grants 2014-2018

3.11. Further recommendations for the AWB RFC

3.11.1. Infrastructure segment

Many railway infrastructure projects currently in progress will upgrade railway links on the AWB RFC, such as eliminating diesel traction on certain rail lines (Vinkvoci-Vukovar and Niš-border SRB/BG) and upgrading the axle load category on some sections (border AT/SLO-Maribor-Zidani Most and Vinkovci-Vukovar). Other projects in progress will upgrade the ERTMS, achieve a freight train (FT) length of 740 m and speed of 100 km/h, but only on some sections of the AWB RFC.

The following table presents details for TEN-T core railway network with regard to its current state in 2018, infrastructure projects to be finished in the near future and potential additional projects to meet the infrastructure needs of the TEN-T.

Table 3.11.1-1: TEN-T (core network) and railway infrastructure needs with regard to the AWB RFC

Description	Current state in 2018	Infrastructure projects in progress in AWB RFC	Additional infra. projects on AWB RFC
Track gauge 1435 mm	✓	✓	No
Line electrification	× (partial)	✓	No
ERTMS (ETCS+GSM-R)	× (partial)	× (partial)	Yes
Line load 22.5 t/axle	× (partial)	✓	No
FT length 740 m	× (partial)	× (partial)	Yes
FT speed 100 km/h	× (partial)	× (partial)	Yes

FT-freight train

Additional infrastructure projects in the near future must go ahead with further ERTMS implementation, regarding communication between the engine driver and traffic management (GSM-R), and line equipment with ETCS levels to assure interoperability. Operability for FT with a length of 740 m should be implemented via station track extensions at selected railway stations to ensure that trains that are 740 m long can operate. The last measure is the most expensive, and this is upgrading of the lines to enable speeds of 100 km/h for freight trains.

Regarding the railway infrastructure on the AWB RFC there are many opportunities and possibilities to make the corridor more competitive, as follows:

- Possibility of using of European, private (from other states) and national funding sources for railway investments.
- Focusing financial resources to remove critical bottlenecks along the AWB RFC.
- Improving the future planning of infrastructure works among different states along the AWB RFC to reduce and minimise negatives impacts on traffic operations.
- Upgrading of the railway infrastructure of the AWB RFC to meet the higher TEN-T standards.
- Ensure proper and effective maintenance of railway infrastructure along the AWB RFC.
- AWB RFC member states should coordinate investment plans regarding the transport infrastructure along the corridor.

It should be mentioned that Sofia, as the capital of Bulgaria with a population of over 1,5 million, has no operational intermodal rail/road terminal at the moment, because the Yana intermodal terminal (located near Sofia, 35 km away) is closed.

3.11.2. Organisational segment

Border crossing simplification: trains lose a lot of time during border crossings, and thus to enhance the competitiveness of the AWB RFC the waiting time must be reduced to the minimum with organisational changes. The pilot case of the intermodal train that ran from Ljubljana to Istanbul in 2009 demonstrates that this could be possible.

Railway infrastructure managers and railway carriers should raise the level of transport service to reduce delays in freight transport and provide more reliability and shorter travel times.

Harmonisation of operational rules and charges. Rules and charges should be implemented at the same level in all AWB RFC member states, and simplified to ensure a more competitive corridor.

Promoting national railway networks for use as local and regional freight terminals that can provide high-quality and competitive intermodal transport services.

The external costs of freight transport should be included in the total transport price and paid by the end users. In this way railway transport could be much more competitive and cheaper. The EU and AWB RFC member states should support a green rail freight transport, by including the negative external costs of transport in the price paid by end users.

Ensure proper and effective traffic management rules and stable and reliable coordination processes for temporary capacity restrictions (bottlenecks) along the corridor.

Continuously improve the quality of market surveys and overall communication between the RFC bodies (as defined by the RFC-Regulation) in order to enable better problem solving.

Railway infrastructure managers of the AWB RFC should actively cooperate with other parallel and crossing RFC to establish permanent cooperation.

Railway infrastructure managers and railway carriers should communicate all the time in order to carry out effective provision of information to all rail users.

The AWB RFC must be promoted as the shortest possible connection between Turkey and Central Europe (Germany). Promotion of intermodal transport on the route could help to shift the cargo from road to the rail.

One other challenge is that Serbia is not yet a member of the EU. If it joined then this would remove many obstacles at border crossings, as the whole of the AWB RFC would be covered by EU member states.

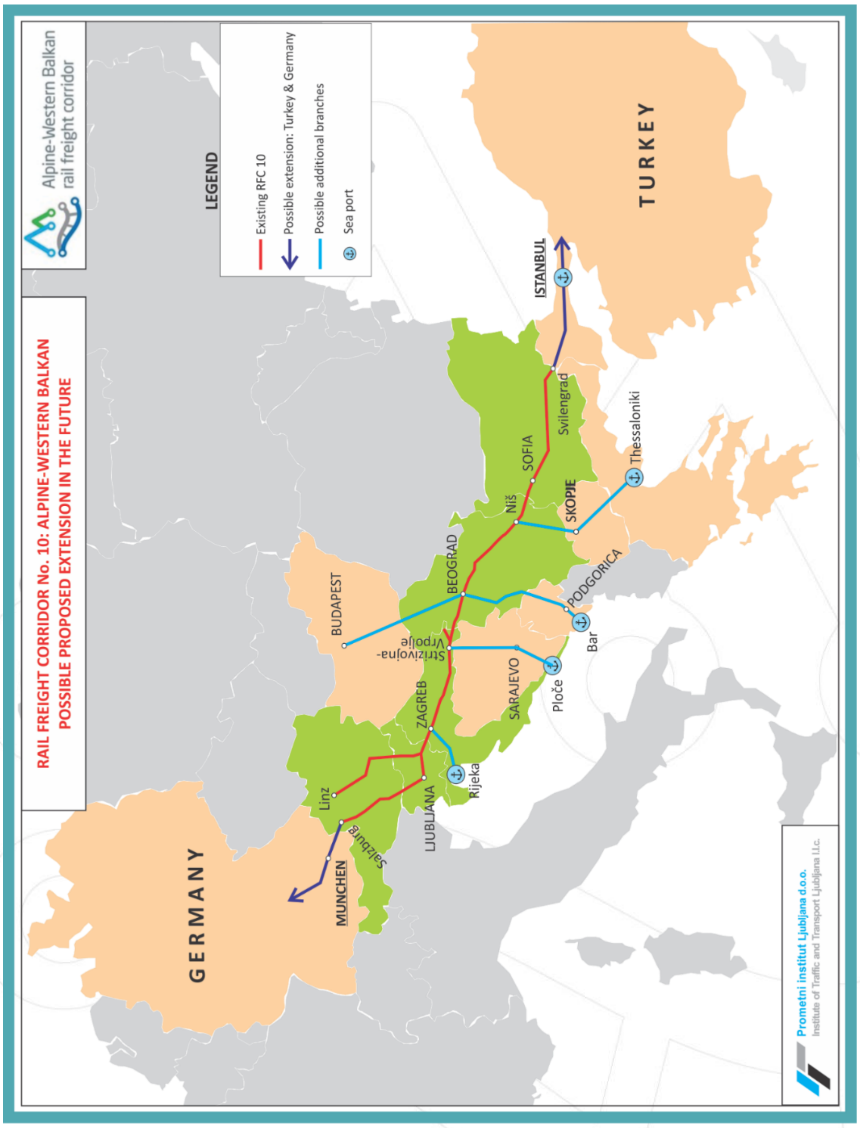
Along the AWB RFC there are many possibilities to shift cargo transport from road to rail, and the right measures should be taken by rail carriers, rail operators and road users to achieve this. The best practice is the use of Ro-Ro ferries between Turkey and Italy and Ro-La trains between Slovenia, Italy and Austria.

Future possible proposed extensions of the AWB RFC could go in different directions. A primary extension could be towards Germany (Munchen) and Turkey (Istanbul). A secondary extension with other additional branches could also be possible in the following four directions:

- from Zagreb via Karlovac to Rijeka (port) in Croatia (the AWB RFC would be parallel to RFC 6: Mediterranean on the route Zagreb-Rijeka)
- from Strizivojna-Vrpolje in Croatia via Sarajevo to Ploče (port) in Bosnia and Herzegovina;
- from Beograd in Serbia to Budapest in Hungary (the AWB RFC would be parallel to RFC 11:Amber on the route Kelebia-Budapest);
- from Beograd in Serbia via Podgorica and Bar (port) in Montenegro;
- from Niš in Serbia via Skopje in North Macedonia to Thessaloniki (port) in Greece.

Possible extensions could also be made to the neighbouring states of Germany, Turkey, Hungary, Bosnia and Herzegovina, Montenegro, North Macedonia and Greece.

Figure 3.11.2-1: Possible proposed extensions of the AWB RFC in the future



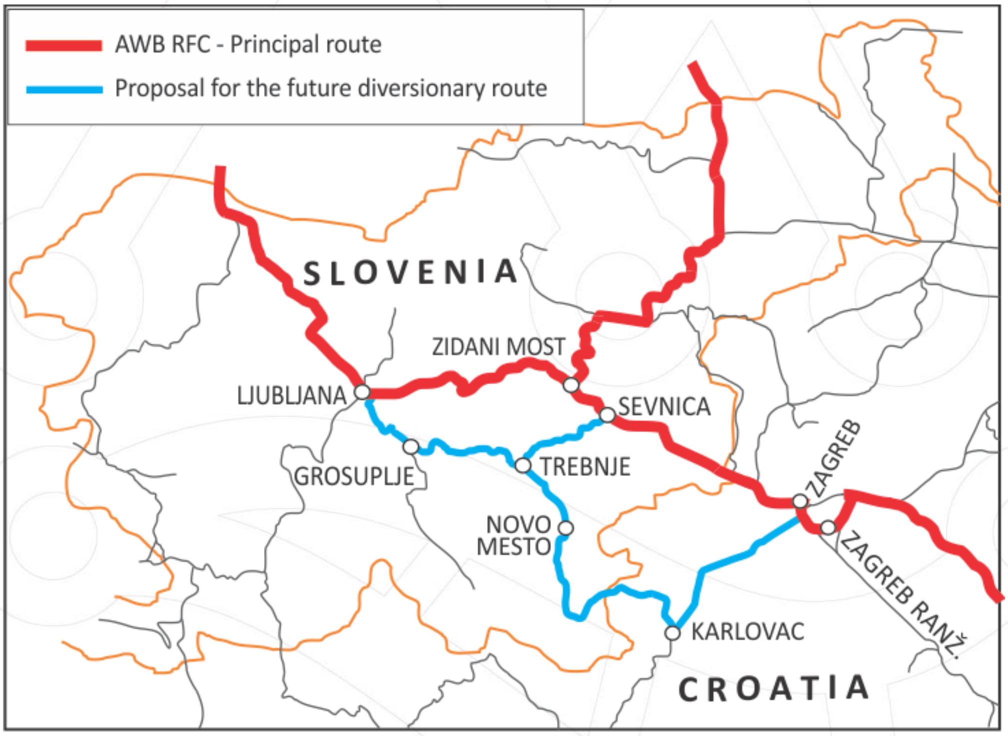
Two capitals, Ljubljana (Slovenia) and Zagreb (Croatia), are connected with the AWB RFC via Zidani Most and Dobova. There are exists a parallel railway line Ljubljana-Grosuplje-Trebnje-Novo mesto-Metlika-state border-Karlovac-Zagreb. This single track railway line has a length of 206,5 km and is mostly not electrified (only electrified on the section Karlovac-Zagreb).

In May 2018, a cooperation agreement on revitalisation of the cross-border railway infrastructure Ljubljana-Grosuplje-Trebnje-Novo mesto-Metlika-Karlovac-Zagreb was signed by the mayors of municipalities along the railway line. The objective of the revitalization of the railway line is to specify and develop innovative and technologically advanced services on the cross-border regional rail network. The purpose of the project is to increase the growth in demand for transport and the users' expectations based on the quality of service.[18]

The line has potential for both freight and passenger transport. It connects many industrial areas in Slovenia (Novo mesto, Trebnje…) and Croatia (Karlovac…).

The line Ljubljana-Novo mesto-Karlovac-Zagreb could be a bypass line in the case of total closure of the line Ljubljana-Zidani Most-Zagreb. After modernisation, the line has potential to be a diversionary route of the AWB RFC.

Figure 3.11.2-2:Proposal for future diversionary route of the AWB RFC



[18] Cooperation Agreement on revitalisation of cross-border railway infrastructure Ljubljana-Grosuplje-Trebnje-Novo mesto-Metlika-Karlovac-Zagreb, Otočec, 23rd May 2018

3.12. Conclusion

Current global and European economic developments have an impact on increasing the demand for transport services, and this is due to the higher consumption of the EU population and the higher production of manufacturing enterprises. The demand is also directly influenced by the need to transport the final and intermediate products from Asia to Europe and vice versa. This demand then creates an offer that results in a larger 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, customers, society 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.

None of the measures taken so far to improve rail freight ehaven`t dealt with common organisation, regulation and optimisation of the network in order to eliminate the shortcomings in continuity and reliability in international rail freight transport. Strengthening the cooperation among infrastructure managers should be primarily focused on the allocation of train paths for freight trains for the purpose of mutual coordination and acceleration of international rail freight transport. The result of coordination with regard to border waiting times is their reduction and the optimal use of the available network for sustainable development of rail transport.

The AWB RFC has got high potential to increase its competitiveness due to its location, tradition and good infrastructure connectivity between Central Europe and South-East Europe and Turkey and thus it can increase transport performances as well as its share of total transport volume within the related countries.

The significant potential of the AWB RFC is underlined by the fact that prior to the dissolution of Yugoslavia – which ended the functioning of the corridor as a seamless transport axis – the volume of transit goods transported along this route was about double the current figures: In 1989, approximately 18 million gross tonnes were shipped by rail along the corridor. One of the key reasons for the decrease in volumes has been a shift of transit traffic to routes further north.

In terms of markets, the AWB RFC will serve two geographically distinct submarkets:

- ➢ Transport related to the regions served by the AWB RFC, including:
  - transport between the regions directly served by the corridor and
  - transport between the regions served by the corridor and other parts of Europe;

- Long-distance transport transiting AWB RFC along its entire length.

In each of these markets there is significant potential to develop rail freight transport, either by shifting transport to rail from other modes (**modal shift effect**) or by developing overall transport volumes via the positive impact of transport improvements on regional economic development and trade (**development and trade effect**).

Historic and current trade data suggest that trade flows and goods traffic between Slovenia, Croatia and Serbia are at a comparatively high level. The establishment of the AWB RFC can help to increase the market share of rail in this significant market. At the same time, there is significant growth potential for freight transport to and from Bulgaria to the other countries along the corridor.

Regarding trade and transport between the states of the AWB RFC and the rest of Europe, it is important to note that the EU is the dominant trading partner of the Western Balkan states. Roughly three quarters of the trade volume of these countries, both in terms of exports and imports, is directed to EU countries, in particular to the core of the EU[19].

Significant growth potential could result from a convergence of the Western Balkan region towards the income and productivity levels seen in Central and Western Europe. The level of economic activity in the countries involved in the AWB RFC is generally well below the average of the 28 EU Member States. Convergence towards EU levels would imply above-average GDP growth rates over the long term. Due to its close relation to economic activity, economic growth would be accompanied by significant growth of freight transport.

The AWB RFC represents the shortest route between Central Europe and Turkey. As shown in subchapter 5.3, “Review of AWB RFC State Markets”, the economic cooperation (trade, goods exchange) between Germany and Turkey is at a high level (Germany is the most important economic partner for Turkey). The AWB RFC route between Munchen and Istanbul is about 350 km shorter than the parallel competitive route via RFC 7 (Bulgaria-Romania-Hungary-Austria).

The railway users’ demands should be take into consideration to improve services and infrastructure along the AWB RFC. The most important demands are: reduction of travel times, elimination of diesel traction, upgrading the axle load category, improving punctuality and

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[19] http://ec.europa.eu/trade/policy/countries-and-regions/regions/western-balkans/

safety, speeding up border crossing procedures, eliminating speed restrictions and bottlenecks, and extension of freight trains.

Many infrastructure projects are in progress with an aim to upgrade the existing railway infrastructure. The focus on future upgrading projects should be on implementation of the ERTMS, extension of station tracks to 740 meters and upgrading of the line speeds. The maintenance of the railway lines and stations should also be sped up.

Another important part of railway transport is the rolling stock – and here the locomotives and wagons are outdated and should gradually be modernised. Locomotives that do not enable interoperability must be changed at the border crossings – thus lengthening the travel time. Modernisation of the rolling stock has to be done by the railway carriers.

As already mentioned in this study, the average external costs for road transport are more than four times higher than rail for freight. In this direction the EU and AWB RFC member states should support green rail freight transport and propose that the negative external costs of transport be paid by the end users.

A good pilot project from 2009 using an intermodal train running from Ljubljana to Istanbul showed that the travel time could be greatly reduced without any investments in the railway infrastructure. The use of good communications and technological procedures alone could thus reduce the travel time and improve the competitiveness of railway transport.

The optimisation of cross-border procedures to reduce travel times must include the railway sector (represented by infrastructure managers, rail carriers….) and public sector (represented by customs, police, etc….). Only common work on this issue could have positive impacts on railway transport.

The cargo potential seen in the countries around the AWB RFC could be the basis for the further extension of the AWB RFC route to other countries, such as Turkey, Germany, Hungary, Bosnia and Herzegovina, North Macedonia and Greece.

4. List of Measures

4.1. Coordination of planned temporary capacity restrictions

Regulation (EU) No 913/2010 (hereinafter: the Regulation), Article 12 “Coordination of works” deal with Temporary Capacity Restrictions (TCR) on the RFC. According to Article 12, “the management board shall coordinate and ensure the publication in one place, in an appropriate manner and timeline, of their schedule for carrying out all the works on the infrastructure and its equipment that would restrict available capacity on the freight corridor”. TCR are necessary to keep the infrastructure and its equipment in operational condition and to allow changes to the infrastructure necessary to satisfy market needs. Because of strong customer demand to know in advance which capacity restrictions they will be confronted with, corridor TCRs have to be coordinated, taking into account the interests of the IMs/AB and of the applicants.

“RNE Guidelines for Coordination / Publication of Planned TCRs” provide recommendations for the process of coordinating and publishing activities reducing the available capacity on a Rail Freight Corridor. The aim is to use a common tool for gathering and publishing necessary information about capacity restrictions.

All possessions on the infrastructure and its equipment that would restrict the available capacity on the corridor shall also be coordinated at the level of the freight corridor and be the subject of updated publication.

AWB RFC manages the process of coordination/publication of possessions in accordance with RNE Guidelines for Coordination / Publication of Planned TCRs.

This goal could be achieved only if the Multi Annual Contracts for financing the infrastructure are provided by the States to the IMs.

More detailed information concerning the coordination of TCRs is available in the CID Book 4 Chapter 4.

4.2. Corridor OSS

<u>Background</u>

According to the decision of the AWB RFC MB, the parties agreed that the C-OSS of AWB RFC will take its role as a joint body set up or designated by a Corridor organization supported by a coordinating IT tool - PCS. Corridor OSS related tasks/liability is detailed in the MB’s Internal Rules of AWB RFC. The working language of the C-OSS is English, prepared documents and possible meetings are held in English in the framework of C-OSS activity.

Requirements

In line with Article 13 of the Regulation, the requirements for the Corridor OSS's role are defined as follows:

- Contact point for Applicants to request and receive answers regarding infrastructure capacity for freight trains crossing at least one border along a Corridor;
- As a coordination tool, it shall provide basic information concerning the allocation of the infrastructure capacity. It shall display the infrastructure capacity available at the time of request and its characteristics in accordance to pre-defined parameters for trains using prearranged paths on the Freight Corridor;
- Shall take a decision regarding applications for pre-arranged paths and reserve capacity;
- Forwarding any request/application for infrastructure capacity which cannot be met by the Corridor OSS to the competent IM(s) and communicating their decision to the Applicant;
- Keeping a path request register available to all interested parties;

The Corridor OSS shall provide the information referred in Article 18 of the Regulation included in the Corridor Information Document drawn up, regularly updated and published by the RFC MB:

- Information contained in the Network Statement for national networks regarding the freight corridor as included in CID Book 2;
- A list and characteristics of terminals, in particular information concerning the conditions and methods of accessing the terminal;

Documentation related to the C-OSS

Documents, which could contribute to the C-OSS operation, are as follows:

- EU Regulation 913/2010 (including the Handbook to the Regulation): spells out the overall framework for setting up the Corridor OSSs;
- RNE Related guidelines;

Availability of the Corridor OSS

It shall be mandatory for all Applicants to use PCS when they request pre-arranged paths. Other questions can be submitted via e-mail or telephone and be answered accordingly. The Corridor OSS is available during regular office hours.

Organization

A dedicated model of the C-OSS was adopted for AWB RFC where the C-OSS will take its role in the Project Management Office in Ljubljana with support of a coordinating IT tool - PCS.

The C-OSS carries out its activities in a transparent, impartial and non-discriminatory manner, respecting the confidentiality of information and reports to the MB of AWB RFC.

Customer Confidentiality

The Corridor OSS is carrying out its assigned working task on behalf of the Management Board consisting of cooperating IMs in the AWB RFC. The task shall be carried out in a non-discriminatory way and under customer confidentiality keeping in mind that the applicants are competing in many cases for the same capacity and transports.

More detailed information concerning the establishment of a One-Stop-Shop is available in the CID Book 4 Chapter 2.

4.3. Capacity Allocation Principles

The Executive Board adopted the AWB RFC Framework for Capacity Allocation (FCA) which is published on the website of AWB RFC. This document is expected to provide an overview on the principles of:

- PaPs and Reserve Capacity offer
- Allocation of PaPs and RC by the C-OSS;
- Regulatory control;
- Applicants (see chapter 4.4);

Capacity management with regard to PaPs and RC follows the standard process defined by RNE, which includes the phases and activities of preparation, publication, requesting, conflict resolution, draft offer, observation, final offer and allocation. Specific dates are set in line with the RNE calendar set up for each year.

Requests for capacity in the running timetable, other than RC, are considered as requests for tailor made paths and are handled by the involved IMs/AB in accordance with concerning national rules. In case of appeal for assistance, the C-OSS provides support, if possible. The level of assistance by the C-OSS is determined on a case-by-case basis.

More details in regards to capacity allocation are provided in CID Book 4 Chapter 3.

4.4. Applicants

Applicants other than railway undertakings or the international groups of railway undertakings are enabled to request capacity on AWB RFC. Entities such as shippers, freight forwarders and combined transport operators may submit requests for PaPs and RC, as well as requests for capacity in the running timetable, other than RC.

In order to use such a train path these applicants shall appoint a railway undertaking to conclude an agreement with the IMs/AB involved and in accordance with national rules of the IMs/AB involved.

More details in regards to applicants are provided in CID Book 4 Chapter 3.

4.5. Traffic Management

In line with Article 16 of the Regulation, the MB of the freight corridor has to set up procedures for coordinating traffic management along the freight corridor.

Traffic management is the prerogative of the national IMs and is subject to national operational rules. The goal of traffic management is to guarantee the safety of train traffic and achieve high quality performance. Daily traffic shall operate as close as possible to the planned. In case of disturbances, IMs work together with the RUs and neighbouring IMs concerned to limit the impact as much as possible and to reduce the overall recovery time of the network.

International traffic is coordinated by national IMs with neighbouring countries on a bilateral level. In this manner they ensure that the whole traffic on the network is managed in the optimal way.

In order to improve the traffic management coordination and communication among involved IMs, use of the following RNE IT tools is foreseen:

- Train Information System (TIS), that provides real time information about train running on the corridor;
- Traffic Control Centre Communication (TCCCom) that enables to send predefined messages which will be translated to the native language on each side of the border;

In the normal daily business trains run according to their timetable, and there is no need for coordination or communication between the TCCs on the corridor.

The participating IMs of AWB RFC aim to examine the harmonisation of TIS with their national systems.

4.6. Traffic Management in Event of Disturbance

If there is any significant deviation from the timetable or in case of disturbance regardless of the cause, communication and coordination between the related IMs is necessary. The communication and coordination are made in line with written agreements between IMs/AB and in line with local cross-border agreements. The main tool to perform those tasks will be the TCCCom, which is an internet based multilingual communication application so all the predefined messages appear at the neighbouring TCC in their national language.

The goal of traffic management in case of disturbance is to ensure the safety of train traffic, while aiming to quickly restore the normal situation and/or minimise the impact of the disruption. The overall aim should be to minimise the overall network recovery time.

For international disruptions longer than 3 days with a high impact on international traffic, the international contingency management, as described in the International Contingency Management handbook (ICM Handbook) applies. The Handbook can be found at the RNE website:

http://www.rne.eu/rneinhalt/uploads/International_Contingency_Management_Handbook_final_v1.5.pdf

An important new element is an international re-routing overview for the Rail Freight Corridors and re-routing scenarios for the critical routes.

More details concerning traffic management are provided in CID Book 4 Chapter 5.

4.7. Quality Evaluation

Quality of service on the freight corridor is a comparable set of indicators to those of the other modes of transport. Service quality is evaluated as a performance. Performance is measured with different performance indicators. These indicators are the tools to monitor the performance of a service provider. The obligation regarding the international rail freight services is based on the provisions of Article 19 of the Regulation.

4.7.1. Performance Monitoring Report

The measurement of performance of rail freight transportation on AWB RFC lines is first of all an obligation stemming from the Regulation and on the other hand it contributes to the development of RFC services, as well. KPIs are necessary for planning and setting the objectives of the RFC, steering its business activities, increasing the added value and the quality of international rail freight, assessing the achievement of objectives, achieving the customers' expectations and preparing useful reports (also, as obligation stemming from Article 19(2) of the Regulation), in order to assess the overall performance of the RFC organisation.

RNE with the cooperation of the already operational Rail Freight Corridors elaborated the Guidelines for Key Performance Indicators of Rail Freight Corridors. It provides recommendations for using a set of KPIs commonly applicable to all RFCs. The RNE KPIs were adopted by the RFC Network too, composed of all RFCs.

In order to use the same quality of data and to reduce the overall efforts of the RFCs and RNE, the same IT tools are used for the calculation of the commonly applicable KPIs. The data are provided by PCS and TIS, while the data processing tool is OBI.

The KPIs are divided into three fields:

- Capacity management, which mean the performance of the AWB RFC in constructing, allocating and selling the capacity, monitored in terms of:

  - Volume of offered capacity;
  - Volume of requested capacity;
  - Volume of requests;
  - Volume of pre-booked capacity;
  - Number of conflicts;

- Operations, which mean the performance of the traffic running along AWB RFC monitored in terms of punctuality and volume of traffic:

  - Punctuality at origin;
  - Punctuality at destination;
  - Number of train runs;

- Market development, which mean the capability of the AWB RFC to meet the market demands and is monitored in terms of:

  - Traffic volume;
  - Relation between the capacity allocated by the C-OSS and the total international traffic.

The results of the performance monitoring (KPIs) together with the Performance Report (under Article 19.2 of the Freight Regulation) will be published once a year on the web site of AWB RFC.

4.7.2. User Satisfaction Survey

According to Article 19(3) of the Regulation the management board shall organise a Satisfaction Survey of the users of the freight corridor and shall publish the results of it annually.

Taking into consideration that AWB RFC will be established on 22 March 2020, the first yearly user satisfaction survey as requested by articleArticle 19(3) will take place in 2021 most probably under RNE's umbrella. Having a common survey managed by RNE providedprovides for comparable results and avoidedavoids that the same customers, operating on different corridors, could be subject to different questionnaires with different structures.

In order to improve the services and performance of the corridor, the results of the survey will be analysed and published on the website, consequently, the customers' increased involvement into further market surveys and problem-solving will be applied.

The User Satisfaction Survey will include:

- Quality of information / application procedures / handling of complaints
- Infrastructure standard
- Train-paths, journey times
- Terminal information
- Train Performance Management

- Traffic Management
- Coordination of planned temporary capacity restrictions
- Communication

4.8. Corridor Information Document

In Article 18, the Regulation refers to a document that should be drawn up, published and regularly updated by the Management Board of the given Rail Freight Corridor.

This document should contain:

- all the information in relation with the Rail Freight Corridor contained in the national network statements;
- information on terminals;
- information on capacity allocation (C-OSS operation) and traffic management, also in the event of disturbance;
- the implementation plan that contains:
    - the characteristics of the Rail Freight Corridor
    - the essential elements of the transport market study that should be carried out on a regular basis
    - the objectives for the Rail Freight Corridor
    - the investment plan described in the Regulation
    - measures to implement the provisions for co-ordination of work, capacity allocation (C-OSS), traffic management, etc;

For this purpose the RailNetEurope, as a corridor service provider, develophas developed the Corridor Information Document Common Text and Structure (hereafter: CID) with the following main structure:

- Book 1 – Generalities
- Book 2 – Network Statement Excerpts Timetabling year Y (fulfilling Article 18a of the Regulation)
- Book 3 – Terminal Description (fulfilling Article 18b of the Regulation)
- Book 4 – Procedures for Capacity and Traffic Management (fulfilling Article 18c of the Regulation)
- Book 5 – Implementation Plan (fulfilling Article 18d of the Regulation)

The CID is a single document and therefore all five books should be considered as integrated. However, all five books may have different updating needs. Any change in the CID can be immediately published except Book 5. Implementation Plan which has specific consultation processes.

The CID for the timetabling year Y shall be published by the 2nd Monday of January of the year Y-1 (the same date as the publication of the pre-arranged train paths).

It is recommended to carry out a parallel publication/updating for the CID every year – one for the timetabling year Y and the second for the timetabling year Y-1, as with the Network Statement process.

All Books of the CID can be updated when necessary according to:

- changes in the rules and deadlines of capacity allocation process;
- changes in the railway infrastructure of the member states;
- changes in services provided by the involved IMs;
- changes in charges set by the member states;
- etc;

The CID is an international document and therefore its original version shall be inthe English language. It is recommended that the English version should prevail over all other translations in case of inconsistencies. In case of inconsistencies between the English and the translated version, if existent, the English version of the CID always prevails. (Any deviations from the above will be indicated separately.)

5. Objectives and performance of the corridor

Art. 19 of the Regulation requires the Management Board to monitor the performance of the corridor and to publish results once a year. The steps needed to meet this requirement of the Regulation are:

- Definition of the strategic vision of the corridor;
- Definition of appropriate and viable key performance indicators (KPIs);
- Setting of reachable quantitative objectives;

Punctuality

Punctuality of a train will be measured on the basis of comparisons between the time planned in the timetable of a train identified by its train number and the actual running time at certain measuring points. A measuring point is a specific location on the route where the trains running data is captured. The comparison should always be done with an internationally agreed timetable for the whole train run.

Punctuality will be measured by setting a threshold up to which trains will be considered as punctual and building up a percentage. A basic punctuality goal of at least 60% of all monitored trains will be set.

Capacity

The objectives to offer capacity via the C-OSS is to have "one face to the customer" for international path requests along the Rail Freight Corridor and at the end harmonized path offers across at least one border. Furthermore the decision on the PaP pre-allocation will be done by the C-OSS by the end of April for the entire international PaP segment on the basis of one harmonized allocation rule. As a result the RUs will get earlier information about the PaP pre-allocation. Capacity related objectives are:

- Response time to questions of customers related to the information function of C-OSS shall be as soon as possible;
- Increasing the allocated pre-arranged paths and reserve capacity with aim of acquiring additional cargo;

Interoperability objectives

For more than a century the development of the railways has been managed nationally on the basis of national requirements rather than a common European approach. As a result international rail transport in Europe is still complex and costly to operate. This segmentation is still a barrier to a Europe-wide rail area even though substantial financial, political and human resources have been invested in integrating the railway systems.

The railway interoperability Directive 2008/57/EC of 17 June 2008 sets out the conditions to be met to achieve interoperability within the Union rail system. These conditions concern the design, construction, placing in service, upgrading, renewal, operation and maintenance of the parts of this system as well as the professional qualifications and health and safety conditions of the staff who contribute to its operation and maintenance. This Directive repeals Directive 96/48/EC on the interoperability of the European high-speed rail system and Directive 2001/16/EC on the interoperability of the European conventional rail system.

In a view of the provisions of EU Directives on the interoperability of the rail system within the European Union, the AWB RFC goal is:

- to contribute to the progressive creation of the internal market in equipment and services for the construction, renewal, upgrading and operation of the rail system within the AWB RFC;
- to contribute to the interoperability of the rail system within AWB RFC;

The system constituting the rail system may be broken down into the following subsystems, either:

- structural areas:
    - infrastructure (track, points, engineering structures - bridges, tunnels, etc., associated station infrastructure - platforms, zones of access, including the needs of persons with reduced mobility, etc., safety and protective equipment);
    - energy (electrification system, including overhead lines and the trackside of the electricity consumption measuring system);
    - trackside control-command and signalling (the trackside equipment required to ensure safety and to command and control movements of trains authorised to travel on the network);
    - on-board control-command and signalling (the on-board equipment required to ensure safety and to command and control movements of trains authorised to travel on the network);
    - rolling stock (vehicle dynamics and superstructure, command and control system for all train equipment, current-collection devices, traction and energy conversion units, braking, coupling and running gear and suspension, doors, man/machine interfaces, passive or active safety devices and requisites for the health of passengers and on-board staff);
- functional areas:
    - operation and traffic management (the procedures and related equipment enabling coherent operation of the various structural subsystems, during both normal and degraded operation, including in particular train composition and train driving, traffic planning and management. The professional qualifications which may be required for carrying out cross-border services);
    - maintenance (procedures, associated equipment, logistics centres for maintenance work);
    - telematics applications for passenger and freight services;

Railway interoperability is developed through the introduction of Technical Specifications of Interoperability (TSIs) concerning the specific subsystems; TSIs are also related to safety issues, even though security and interoperability are, at present, regulated by different normative initiatives. The European Railway Agency (ERA) is directly involved in the interoperability process with the role of advising and assisting the process. Moreover, ERA is in charge for the development of some TSIs.

The main obstacles to the railway interoperability concerns three main subsystems:

- *infrastructure*: presence of different axle load, tunnel gauges, train length;
- *energy:* presence of different power systems (A.C. systems and D.C. systems or without electrification) and different pantograph;
- *control-command and signalling:* presence of different signalling and train control systems (in general, one or more system per national network).

The presence of several signalling and train control systems impacts negatively on:

- costs: (brand-new) interoperable locomotive must be equipped with the specific signalling interface of every single national network where it is allowed to operate;
- reliability: the presence of several systems and interfaces reduce the possibility of introducing redundancies, with consequent possible higher number of breakdowns;
- safety, intended as "drivers' interoperability": drivers must get familiar with several systems and interfaces to be allowed driving trains on different national networks. This can lead to a reduction in the overall safety levels and higher human errors rate;
- interoperability of existing rolling stock: existing rolling stock must be retrofitted with further system and interfaces; this has proven to be difficult in several cases. In fact, once locomotives have been designed it is extremely expensive and sometimes impossible to add more on board systems;

Other obstacles to interoperability reflect differences in the present national technical specifications, such as fire extinguisher on board, back lights and so on. The modification of these specifications in the view of better interoperability is often refused or delayed by national authorities for different reasons, such as the safety reasons.

In the medium term such micro obstacles have to be eliminated to prevent a further obstacle to the full interoperability of the AWB RFC.

According to Directive 2004/49/CE, some derogation to application of TSIs are possible; the derogation should be identified and explained.

Striving to fulfill the interoperability objectives as much as possible, the AWB RFC is developing the Capacity Improvement and Operational Bottleneck Study where the physical, technical and functional bottlenecks will be analysed and corrective measures will be proposed by the provider of the study. The study will demonstrate the main obstacles for improving the rail freight traffic on the AWB RFC and could potentionally serve as the basis for decision makers.

The national implementation plans of particular TSI shall be considered in oder to monitor future development of interoperable infrastructure with capacity development concerned.

6. Investment Plan

The investment plans were obtained from IMs in summer 2019 for the TT 2020/2021 and will be renewed for the next TT period.

The IMs shall provide national investment plans with identification where the TEN-T standards and TSIs plans are not to be met by 2030.

The investment plans include the investment projects relating to renewal, enhancement and construction of tracks, electrification systems, signalling systems, tunnels, bridges, sidings, passing tracks, extra tracks, or any other railway infrastructure.

The benefits of the infrastructure projects are different. It can relate to the improvement of only one parameter or to the multiple improvements. The most common improvements refer to:

- relief of bottlenecks, in order to make the infrastructure more available;
- increasing the safety/security;
- increasing the speed to increase competitiveness, especially regarding the road transportation;
- improvement of punctuality;
- better protection of environment in order to comply with national laws;
- deployment of interoperability to increase the competitiveness;
- maintenance of railway infrastructure, especially the renewal of tracks;
- capacity improvement;

6.1. Capacity Management Plan

The Capacity Management Plan includes removing the identified bottlenecks taking into the consideration the improvements of technical parameters, such as increasing the length, loading gauge, and load hauled or axle load, speed management etc.

Plans up to 2025

AUSTRIA

2025		SECTION LENGHT km	LINE TYPE PRINCIPAL ROUTE	LINE TYPE DIVERSIONARY	LINE TYPE CONNECTING/FEEDER	TRACK GAUGE 1435 mm	TRACK GAUGE 1520	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	AXLE LOAD 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE UIC Guideline	LOADING GAUGE Lines	LOADING GAUGE Tunnels	POWER SUPPLY DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE) ‰ towards NS Direction 1	‰ towards SN Direction 2
OBB	Graz - Border next to Spielfeld/Straß	48,70	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	7,00	7,00
	Bruck a.d. Mur - Graz	53,50	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	7,00	7,00
	Bruck a.d. Mur - St. Michael	25,90	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	13,00	13,00
	St. Michael - Selzthal	63,30	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	15,00	15,00
	Traun - Selzthal	96,10	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	21,00	21,00
	Linz - Traun	8,10	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	26,00	26,00
	Marchtrenk - Traun	13,19	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	12,00	12,00
	Marchtrenk - Wels	6,60	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	13,00	13,00
	Villach - Staatsgrenze next to Rosenbach	29,98	x			x												x				x			x			x		P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	22,00	22,00
	Spittal-Milstättersee - Villach	35,70	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	6,00	6,00
	Schwarzach-St. Veit - Spittal-Milstättersee	80,90	x			x												x				x		x	x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	29,00	29,00
	Bischofshofen - Schwarzach-St. Veit	14,20	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	10,00	10,00
	Salzburg - Bischofshofen	52,30	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	11,00	11,00

SLOVENIA

2025		SECTION LENGHT km	LINE TYPE PRINCIPAL ROUTE	LINE TYPE DIVERSIONARY	LINE TYPE CONNECTING/FEEDER	TRACK GAUGE 1435 mm	TRACK GAUGE 1520 mm	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	AXLE LOAD 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE UIC Guideline	LOADING GAUGE Lines	LOADING GAUGE Tunnels	DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE) ‰ towards NS	‰ towards SN
SŽ-I	*St. border - Dobova - Zidani Most*	51	X			X		X					x									x		x			x			P/C 99/429	GB			x		PZB + ETCS L1	0_5	0_5
	Zidani Most - Ljubljana	64	X			X		X					x									x		x		x				P/C 99/429	GB			x		PZB + ETCS L1	0_5	0_5
	Ljubljana - Jesenice - St. border	71	X			X								x								x		x			x			P/C 99/429	GB			x		PZB	15_20	5_10
	Zidani Most - Pragersko	73	X			X		X										x				x			x			x		P/C 90/410	GC			x		PZB + ETCS L1	5_10	5_10
	Pragersko - Maribor	18	X			X		X										x				x			x				x	P/C 80/400	GC			x		PZB + ETCS L1	0_5	0_5
	Maribor - Šentilj - St. border	17	X			X												x				x			x		x			P/C 80/400	GC			x		PZB + ETCS L1	5_10	5_10

PZB Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control

CROATIA

2025		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
HŽI	Savski Marof St. Bor. - Savski Marof	5,092	X			X		X						X								X			X				X	80/410	GC				X	SI	0	3
HŽI	Savski Marof - Zaprešić	6,540	X			X		X						X								X			X				X	80/410	GC				X	PZB	1	1
HŽI	Zaprešić - Zagreb Zap. Kolodvor	13,008	X			X		X						X								X			X				X	80/410	GC*				X	PZB	3	3
HŽI	Zagreb Zap. Kolodvor - Zagreb RK	10,685	X			X		X***						X								X			X	X				80/410	GC				X	PZB	3	4
HŽI	Zagreb RK - Sesvete	11,981	X			X		X						X								X			X				X	80/410	GC				X	PZB	6	5
HŽI	Sesvete - Dugo Selo	10,156	X			X		X						X								X			X				X	80/410	GC				X	PZB	1	5
HŽI	Dugo Selo - Banova Jaruga	66,932	X			X							X									X			X		X			80/410	GC*				X	PZB	5	5
HŽI	Banova Jaruga - Novska	17,279	X			X											X					X			X		X			80/410	GC*				X	PZB	4	3
HŽI	Novska - Nova Kapela Batrina	56,618	X			X		X						X								X			X				X	80/410	GC				X	PZB/ETCS L1**	6	6
HŽI	Nova Kapela Batrina - Strizivojna Vrpolje	62,590	X			X		X						X								X			X				X	80/410	GC				X	PZB	5	6
HŽI	Strizovojna Vrpolje - Vinkovci	31,937	X			X		X							X							X			X				X	80/410	GC				X	PZB	4	3
HŽI	Vinkovci - Tovarnik	32,375	X			X		X							X							X			X				X	80/410	GC				X	PZB/ETCS L1**	4	6
HŽI	Vinkovci - Vukovar	18,542	X			X				X*****												X			X				X	80/410	GC					SI	5	5
HŽI	Tovarnik - Tovarnik St. Bor.	1,547	X			X		X									X					X			X			X		80/410	GC				X	SI	0	1

* GB	for section Zaprešić - Zagreb Zap. kolodvor bridge Krapina and fence between tracks; section Dugo Selo - Kutina bridge Česma; section Kutina - Banova Jaruga bridge Ilova; section Banova Jaruga - Novska bridge Pakra
SI	Station Interdependence
PZB	Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control
** ETCS level 1	Novska - Okučani
***	Double track on section Zagreb Klara - Zagreb RK
	Opposite direction of the section Zagreb Zap. Kolodvor - Zagreb RK OS is 139 m shorter
*****	section Vukovar Borovo Naselje - Vukovar escluded from INF TSI

SERBIA

2025		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT (/INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
IŽS	St. Border - Šid	6	X			X		☑									☑					X		X			X	X			GB	GB			X	ID	4	1
IŽS	Šid- Ruma	52	X			X		☑						☑								X		X		X		X			GB	GB			X	PZB+CTC	3	4
IŽS	Ruma- Golubinci	20	X			X		☑									☑					X		X				X	X		GB	GB			X	PZB+CTC	6	6
IŽS	Golubinci- Stara Pazova	9	X			X		☑									☑					X		X			X		X		GB	GB			X	PZB+CTC	3	9
IŽS	Stara Pazova- Batajnica	14	X			X		☑									☑					X		X		X					GB	GB			X	PZB+CTC	1	3
IŽS	Batajnica- Beograd Ranžirna	26	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	7	8
IŽS	Beograd Ranžirna- Resnik	10	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	17	11
IŽS	Beograd Ranžirna- Rakovica- Mala Krsna-Velika Plana	99	X			X							☑									X			X	X		X			GB	GB			X	PZB+CTC	13	10
IŽS	Resnik- Velika Plana	76	X			X											☑					X			X	X		X			GB	GB			X	PZB+CTC	15	15
IŽS	Velika Plana- Lapovo	19	X			X		☑					☑									X			X	X		X			GB	GB			X	PZB+CTC	5	6
IŽS	Lapovo- Stalać	64	X			X		☑					☑									X			X	X	X	X	X		GB	GB			X	PZB+CTC	5	4
IŽS	Stalać-Niš Ranžirna	62	X			X		☑*				☑										X			X	X	X	X			GB	GB			X	PZB+CTC	7	6
IŽS	Niš Ranžirna-Dimitrovgrad	101	X			X									☑							X		X				X			GB	GB			X	ID	10	6
IŽS	Dimitrovgrad- St. Border Serbia/Bulgaria	7	X			X											☑					X			X		X				GB	GB			X	ID	12	-

* double track Đunis - Trupale; single tracks Stalać - Đunis and Trupale - Niš ranžirna

Please give the explanation for abbreviation and special marks!!

PZB - Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control

CTC - Centralized traffic control

ID - Inter station Dependence

* the lines where technical parameters are expected to improve are marked yellow

During the reconstruction of a part of the line Niš Ranžirna - Dimitrovgrad, some stations will be reconstructed, which will enable the traffic of longer trains. Also train speed will be increased on this section

BULGARIA

	2025	SECTION LENGHT km	LINE TYPE PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	TRACK GAUGE 1435 mm	1520	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION ≤ 200 m	≤ 360 m	≤ 450 m	≤ 500 m	≤ 550 m	≤ 575 m	≤ 600 m	≤ 625 m	≤ 650 m	≤ 740 m	AXLE LOAD 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE UIC Guideline	LOADING GAUGE Lines	Tunnels	POWER SUPPLY DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS [3]	GRADIENT / (INCLINE) [2] ‰ towards NS	‰ towards SN
NRIC	St. Border Serbia/Bulgaria - Kalotina Zapad	0,800	X			X											x					X			X	X				59/389	GB				X	RSABS	-7,2	
NRIC	Kalotina Zapad - Kalotina	2,000	X			X				X												X			X	X				59/389	GB				X	RSABS	-20,5	
NRIC	Kalotina - Dragoman	11,720	X			X											x					X			X	X				59/389	GB				X	RSABS	-21,0	
NRIC	Dragoman - Aldomirovtsi	7,052	X			X												X				X			X	X				59/389	GB				X	RSABS	18,5	
NRIC	Aldomirovtsi - Voluyak	27,435	X			X											x					X			X	X				59/389	GB				X	RSABS	20,5	
NRIC	Voluyak - Sofia	7,793	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	9,7	9,2
NRIC	Sofia - Kazichene	14,353	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-9,6	-9,6
NRIC	Kazichene -Vakarel	24,919	X			X		X										X				X			X				X	59/389	GC	GC			X	ABS-AC + ECTS-L1	19,5	19,5
NRIC	Vakarel - Septemvri	63,526	X			X		X										x				X			X				X	59/389	GC	GC			X	ABS-AC + ECTS-L1	-20,0	-20,0
NRIC	Septemvri - Stamboliyski	35,361	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-7,6	-6,5
NRIC	Stamboliyski - Plovdiv	17,155	X			X		X										x				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-7,1	-7,1
NRIC	Plovdiv - Krumovo	11,698	X			X		X										x				X			X		X			59/389	GB				X	ABS + ECTS-L1	2,5	2,5
NRIC	Krumovo - Katunitsa	4,887	x			x												x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	1,6	
NRIC	Katunitsa - Popovitsa	16,913	x			x		x										x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	-7,5	7,5
NRIC	Popovitsa - Dimitrovgrad	46,799	x			x											x					x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	10,0	
NRIC	Dimitrovgrad - Simeonovgrad	27,031	X			X											X					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	12,0	
NRIC	Simeonovgrad - Svilengrad	40,522	X			X											X					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	10,0	
NRIC	Svilengrad - St. Border Bulgaria/Turkey	18,862	X			X																X			X				X	59/389	GC				X	RSABS	8,8	
NRIC	Svilengrad - St. Border Bulgaria/Greece	3,890	X			X																X			X		X			59/389	GC				X	RSABS	8,0	

Remarks

[1] - maximum longitudinal gradient of track N1 in the direction of travel of the route from the second column; the "+" sign means climb, the "-"descent

[2] - in case of double track - maximum longitudinal slope of track N2 opposite to the direction of movement of the route from the second column; the "+" sign means climb, the "-"descent

[3] - systems for providing and controlling the movement of trains: automatic blocking sistems with axle counters without trought signals - ABS-AC; automatic blocking sistems with trought signals - ABS; relay semi-automatic blocking sistem - RSABS; automatical cab sistem - ACS; european train control sistem level 1 - ETCS-L1.

Plans up to 2030

AUSTRIA

2030		SECTION LENGHT km	LINE TYPE: PRINCIPAL ROUTE	LINE TYPE: DIVERSIONARY	LINE TYPE: CONNECTING/FEEDER	TRACK GAUGE: 1435 mm	TRACK GAUGE: 1520	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION: 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	AXLE LOAD: 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE: 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED: v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE: UIC Guideline	LOADING GAUGE: Lines	LOADING GAUGE: Tunnels	POWER SUPPLY: DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE): ‰ towards NS Direction 1	‰ towards SN Direction 2
OBB	Graz - Border next to Spielfeld/Straß	48,70	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	7,00	7,00
OBB	Bruck a.d. Mur - Graz	53,50	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	7,00	7,00
OBB	Bruck a.d. Mur - St. Michael	25,90	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	13,00	13,00
OBB	St. Michael - Selzthal	63,30	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	15,00	15,00
OBB	Traun - Selzthal	96,10	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	21,00	21,00
OBB	Linz - Traun	8,10	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	26,00	26,00
OBB	Marchtrenk - Traun	13,19	x			x												x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	12,00	12,00
OBB	Marchtrenk - Wels	6,60	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	13,00	13,00
OBB	Villach - Staatsgrenze next to Rosenbach	29,98	x			x												x				x			x			x		P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB (ETCS L2 + PZB Villach - Villach Süd)	22,00	22,00
OBB	Spittal-Milstättersee - Villach	35,70	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	6,00	6,00
OBB	Schwarzach-St. Veit - Spittal-Milstättersee	80,90	x			x												x				x		x	x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	29,00	29,00
OBB	Bischofshofen - Schwarzach-St. Veit	14,20	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	10,00	10,00
OBB	Salzburg - Bischofshofen	52,30	x			x		x										x				x			x				x	P/C 80/410	GA, G1, G2		15 kV 16,7Hz			PZB	11,00	11,00

SLOVENIA

2030		SECTION LENGHT km	LINE TYPE: PRINCIPAL ROUTE	LINE TYPE: DIVERSIONARY	LINE TYPE: CONNECTING/FEEDER	TRACK GAUGE: 1435 mm	TRACK GAUGE: 1520 mm	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION: 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	AXLE LOAD: 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE: 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED: v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE: UIC Guideline	LOADING GAUGE: Lines	LOADING GAUGE: Tunnels	DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE): ‰ towards NS	‰ towards SN
SŽ-I	*St. border - Dobova - Zidani Most*	51	X			X		X										x				x			x				x	P/C 99/429	GC			x		ETCS L1	0_5	0_5
SŽ-I	*Zidani Most - Ljubljana*	64	X			X		X										x				x		x			x			P/C 99/429	GC			x		ETCS L1	0_5	0_5
SŽ-I	*Ljubljana - Jesenice - St. border*	71	X			X												x				x			x			x		P/C 99/429	GC			x		ETCS L1	15_20	5_10
SŽ-I	*Zidani Most - Pragersko*	73	X			X		X										x				x			x			x		P/C 90/410	GC			x		ETCS L1	5_10	5_10
SŽ-I	*Pragersko - Maribor*	18	X			X		X										x				x			x				x	P/C 80/400	GC			x		ETCS L1	0_5	0_5
SŽ-I	*Maribor - Šentilj - St. border*	17	X			X												x				x			x		x			P/C 80/400	GC			x		ETCS L1	5_10	5_10

CROATIA

2030		SECTION LENGHT km	LINE TYPE: PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	TRACK GAUGE: 1435 mm	1520 mm	DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION: 200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	AXLE LOAD: 18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	LOAD PER METRE: 6,4 T/m	7,2 T/m	8,0 T/m	TRAIN SPEED: v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	INTERMODAL LOADING GAUGE: UIC Guideline	LOADING GAUGE: Lines	Tunnels	POWER SUPPLY: DC 1500 V	DC 3000 V	AC 25000 V	TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE): ‰ towards NS	‰ towards SN
HŽI	Savski Marof St. Bor. - Savski Marof	5,092	X			X		X										X				X			X				X	80/410	GC				X	SI	0	3
HŽI	Savski Marof - Zaprešić	6,540	X			X		X										X				X			X				X	80/410	GC				X	PZB	1	1
HŽI	Zaprešić - Zagreb Zap. Kolodvor	13,008	X			X		X										X				X			X				X	80/410	GC				X	PZB	3	3
HŽI	Zagreb Zap. Kolodvor - Zagreb RK	10,685	X			X		X*										X				X			X	X				80/410	GC				X	PZB	3	4
HŽI	Zagreb RK - Sesvete	11,981	X			X		X										X				X			X				X	80/410	GC				X	PZB	6	5
HŽI	Sesvete - Dugo Selo	10,156	X			X		X										X				X			X				X	80/410	GC				X	PZB	1	5
HŽI	Dugo Selo - Banova Jaruga	66,932	X			X		X										X				X			X				X	80/410	GC				X	ETCS L1	5	5
HŽI	Banova Jaruga - Novska	17,279	X			X		X										X				X			X				X	80/410	GC				X	ETCS L1	4	3
HŽI	Novska - Nova Kapela Batrina	56,618	X			X		X						X				X				X			X				X	80/410	GC				X	PZB/ETCS L1**	6	6
HŽI	Nova Kapela Batrina - Strizivojna Vrpolje	62,590	X			X		X						X				X				X			X				X	80/410	GC				X	ETCS L2****	5	6
HŽI	Strizovojna Vrpolje - Vinkovci	31,937	X			X		X							X			X				X			X				X	80/410	GC				X	ETCS L2****	4	3
HŽI	Vinkovci - Tovarnik	32,375	X			X		X										X				X			X				X	80/410	GC				X	PZB/ETCS L1**	4	6
HŽI	Vinkovci - Vukovar	18,542	X			X				X***												X			X				X	80/410	GC					ETCS L1	5	5
HŽI	Tovarnik - Tovarnik St. Bor.	1,547	X			X		X									X					X			X			X		80/410	GC				X	SI	0	1

SI Station Interdependence
PZB Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control
** ETCS level 1 Novska - Okučani

* Double track on section Zagreb Klara - Zagreb RK
Opposite direction of the section Zagreb Zap. Kolodvor - Zagreb RK OS is 139 m shorter

*** on section Vukovar Borovo Naselje - Vukovar, escluded from INF TSI
**** Okučani - Vinkovci

SERBIA

2030		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS	GRADIENT / (INCLINE)	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520 mm		200 m	360 m	450 m	500 m	550 m	575 m	600 m	625 m	650 m	740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
IŽS	St. Border - Šid	6	X			X		☑									☑					X		X			X	X			GB	GB			X	ID	4	1
	Šid- Ruma	52	X			X		☑						☑								X		X		X		X			GB	GB			X	PZB+CTC	3	4
	Ruma- Golubinci	20	X			X		☑									☑					X		X				X	X		GB	GB			X	PZB+CTC	6	6
	Golubinci- Stara Pazova	9	X			X		☑									☑					X		X			X		X		GB	GB			X	PZB+CTC	3	9
	Stara Pazova- Batajnica	14	X			X		☑									☑					X		X		X					GB	GB			X	PZB+CTC	1	3
	Batajnica- Beograd Ranžirna	26	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	7	8
	Beograd Ranžirna- Resnik	10	X			X											☑					X			X	X					GB	GB			X	PZB+CTC	17	11
	Beograd Ranžirna- Rakovica- Mala Krsna- Velika Plana	99	X			X							☑									X			X	X		X			GB	GB			X	PZB+CTC	13	10
	Resnik- Velika Plana	76	X			X											☑					X			X	X		X			GB	GB			X	PZB+CTC	15	15
	Velika Plana- Lapovo	19	X			X		☑					☑									X			X	X		X			GB	GB			X	PZB+CTC	5	6
	Lapovo- Stalać	64	X			X		☑					☑									X			X	X	X	X	X		GB	GB			X	PZB+CTC	5	4
	Stalać-Niš Ranžirna	62	X			X		☑*				☑										X			X	X	X	X			GB	GB			X	PZB+CTC	7	6
	Niš Ranžirna-Dimitrovgrad	101	X			X									☑							X		X				X			GB	GB			X	ID	10	6
	Dimitrovgrad- St. Border Serbia/Bulgaria	7	X			X											☑					X			X		X				GB	GB			X	ID	12	-

* double track Đunis - Trupale; single tracks Stalać - Đunis and Trupale - Niš ranžirna

Please give the explanation for abbreviation and special marks!!

PZB - Punktförmige Zugbeeinflussung/INDUSI/ spot-wise train control

CTC - Centralized traffic control

ID - Inter station Dependence

* the lines where technical parameters are expected to improve are marked yellow

The whole section Niš Ranžirna - Dimitrovgrad will be electrified

BULGARIA

2030		SECTION LENGHT	LINE TYPE			TRACK GAUGE		DOUBLE TRACK	MAX. TRAIN LENGHT INCL. TRACTION										AXLE LOAD				LOAD PER METRE			TRAIN SPEED				INTERMODAL LOADING GAUGE	LOADING GAUGE		POWER SUPPLY			TRAIN PROTECTION SYSTEMS [3]	GRADIENT / (INCLINE) [2]	
		km	PRINCIPAL ROUTE	DIVERSIONARY	CONNECTING/FEEDER	1435 mm	1520		≤ 200 m	≤ 360 m	≤ 450 m	≤ 500 m	≤ 550 m	≤ 575 m	≤ 600 m	≤ 625 m	≤ 650 m	≤ 740 m	18,0 T/axle	20,0 T/axle	21,0 T/axle	22,5 T/axle	6,4 T/m	7,2 T/m	8,0 T/m	v ≤ 75 km/h	75 < v ≤ 90 km/h	90 < v ≤ 100 km/h	v > 100 km/h	UIC Guideline	Lines	Tunnels	DC 1500 V	DC 3000 V	AC 25000 V		‰ towards NS	‰ towards SN
NRIC	St. Border Serbia/Bulgaria - Kalotina Zapad	0,800	X			X												X				X			X		X			59/389	GC				X	RSABS	-7,2	
NRIC	Kalotina Zapad - Kalotina	2,000	X			X												X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-20,5	
NRIC	Kalotina - Dragoman	11,720	X			X		X										X				X			X				X	59/389	GC	GC			X	ABS-AC + ECTS-L1	-21,0	-15,0
NRIC	Dragoman - Aldomirovtsi	7,052	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	18,5	18,5
NRIC	Aldomirovtsi - Voluyak	27,435	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	15,0	15,0
NRIC	Voluyak - Sofia	7,793	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	9,7	9,2
NRIC	Sofia - Kazichene	14,353	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-9,6	-9,6
NRIC	Kazichene -Vakarel	24,919	X			X		X										X				X			X				X	59/389	GC	GC			X	ABS-AC + ECTS-L1	19,5	19,5
NRIC	Vakarel - Septemvri	63,526	X			X		X										X				X			X				X	59/389	GC	GC			X	ABS-AC + ECTS-L1	-20,0	-20,0
NRIC	Septemvri - Stamboliyski	35,361	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-7,6	-6,5
NRIC	Stamboliyski - Plovdiv	17,155	X			X		X										X				X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	-7,1	-7,1
NRIC	Plovdiv - Krumovo	11,698	X			X		X										X				X			X		X			59/389	GC				X	ABS + ECTS-L1	2,5	2,5
NRIC	Krumovo - Katunitsa	4,887	x			x												x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	1,6	
NRIC	Katunitsa - Popovitsa	16,913	x			x		x										x				x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	-7,5	7,5
NRIC	Popovitsa - Dimitrovgrad	46,799	x			x											x					x			x				x	59/389	GC				x	ABS-AC + ECTS-L1	10,0	
NRIC	Dimitrovgrad - Simeonovgrad	27,031	X			X											X					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	12,0	
NRIC	Simeonovgrad - Svilengrad	40,522	X			X											X					X			X				X	59/389	GC				X	ABS-AC + ECTS-L1	10,0	
NRIC	Svilengrad - St. Border Bulgaria/Turkey	18,862	X			X																X			X				X	59/389	GC				X	RSABS	8,8	
NRIC	Svilengrad - St. Border Bulgaria/Greece	3,890	X			X																X			X		X			59/389	GC				X	RSABS	8,0	

Remarks

[1] - maximum longitudinal gradient of track N1 in the direction of travel of the route from the second column; the "+" sign means climb, the "-"descent

[2] - in case of double track - maximum longitudinal slope of track N2 opposite to the direction of movement of the route from the second column; the "+" sign means climb, the "-"descent

[3] - systems for providing and controlling the movement of trains: automatic blocking sistems with axle counters without trought signals - ABS-AC; automatic blocking sistems with trought signals - ABS; relay semi-automatic blocking sistem - RSABS; automatical cab sistem - ACS; european train control sistem level 1 - ETCS-L1.

6.2. List of Projects

The list of investment projects which includes the projects foreseen for development of the infrastructure along a corridor together with financial requirements and sources is given in the tables below.

AUSTRIA

INVESTMENT PLAN TT 2020/2021 ALPINE-WESTERN BALKAN CORRIDOR													
	Country	**Railway section**	**Nature of Projects**	**Benefits for ABW**	**Start date of the works**	**End date of the works**	**Actual step**	**Estimation of the costs in M€**	**Funder 1**	**Funder 2**	**Funder 3**	**Funder 4**	**Comments**
1	AT	Bischofshofen - Salzburg	Golling-Abtenau - Sulzau; Improvement of alignment	Speed increase	2018	2022	Construction works ongoing	32	ÖBB-Rahmenplan				
2	AT	Graz - Bruck a.d. Mur	Station reconfigurations Bruck a.d.M - Graz (Mixnitz-Bärenschützklamm, Frohnleiten, Peggau-Deutschfeistritz,	Capacity improvement; new 740m sidings	2015	2027	Construction works ongoing	212	ÖBB-Rahmenplan				

			Gratwein-Gratkorn) incl. 740m sidings										
3	AT	Spielfed-Straß - Graz	Graz – Weitendorf; 4. Track upgrade; Connection to Terminal and Ariport link; Connection Koralm line	Capacity improvement (4 track upgrade), Terminal connection	2000	2025	Construction works ongoing	880	ÖBB-Rahmenplan				Part of overall “Koralm Line Project”

SLOVENIA

INVESTMENT PLAN TT 2020/2021 ALPINE-WESTERN BALKAN CORRIDOR													
	Country	**Railway section**	**Nature of Projects**	**Benefits for ABW**	**Start date of the works**	**End date of the works**	**Actual step**	**Estimation of the costs in M€**	**Funder 1**	**Funder 2**	**Funder 3**	**Funder 4**	**Comments**
1	SL	Station Maribor and Pesnica – Šentilj (stations Šentilj, Pesnica and Maribor)	Partially creation of new structure, upgrading of tracks, passing tracks, extra tracks and catenary system	Bottleneck relief Capacity improvement	2017	2020	in process	110		State			
2	SL	Pragersko – Zidani Most (stations	Partially creation of new structure, upgrading of	Bottleneck relief	2017	2020	in process	70		State			

		Poljčane, Celje and Laško)	tracks, passing tracks, extra tracks and catenary system	Capacity improvement										
3	SL	Station Pragersko	Creation of siding, passing tracks, extra Tracks, catenary system	Capacity improvement	2018	2021	in process	63		State				
4	SL	Zidani Most-Celje	Partially creation of new structure, upgrading of tracks, passing tracks, extra tracks and catenary system	Bottleneck relief Capacity improvement	2016	2021	in process	282		State				
5	SL	Zidani Most - Dobova	Signaling enhancement (ERTMS…)	Interoperability	2017	2019	in the final phase - system certification	8		State				

CROATIA

INVESTMENT PLAN TT 2020/2021 ALPINE-WESTERN BALKAN CORRIDOR													
	Country	**Railway section**	**Nature of Projects**	**Benefits for ABW**	**Start date of the works**	**End date of the works**	**Actual step**	**Estimation of the costs in M€**	**Funder 1**	**Funder 2**	**Funder 3**	**Funder 4**	**Comments**
1	HR	Vinkovci – Vukovar	Reconstruction and electrification	Capacity improvement	2019	2021	Public procurement in process	70,6	EU	State			
2	HR	Zagreb Gk – Savski Marof	Renewal of tracks	Bottleneck relief	2019	2021	Public procurement in process	63		State			

SERBIA

INVESTMENT PLAN TT 2020/2021 ALPINE-WESTERN BALKAN CORRIDOR														
	Country	**Railway section**		**Nature of Projects**	**Benefits for ABW**	**Start date of the works**	**End date of the works**	**Actual step**	**Estimation of the costs in M EUR**	**Funder 1**	**Funder 2**	**Funder 3**	**Funder 4**	**Comments**
1	Serbia	Stage 1: Belgrade Center (excl.) – Zemun (incl.)	left	Modernization (construction and reconstruction) of the railway line Belgrade – Subotica –state border (Kelebia) section **Belgrade Center – Stara Pazova**	Construction of new lines and improving parameters of existing lines	Q3 2018	Q1 2020	Contract is signed and works have started	307,4	State	Chinese loan			Works are executed with interruption of traffic along the right/left track during time interval from 10:00 pm to 05:00 am
			right			Upon completion of reconstruction of the left track	288 days							
		Stage 2: Batajnica (incl.)- Stara	left			Q2 2019	Q3 2020	Contract is signed						Works are executed with interruption of traffic along the right/left track

		Pazova incl.)												during time interval from 10:00 pm to 05:00 am
			right			Upon completion of reconstruction of the left track	393 days							
		Stage 3: Zemun (excl.)- Batajnica (excl.)	right			Upon completion of reconstruction of the entire sections Belgrade Center – Zemun and Batajnica – Stara Pazova	229 days	Contract is signed						Works are executed with interruption of traffic along the left/ right track during time interval from 10:00 pm to 05:00 am
			left			Upon completion of reconstruction of the right track	216 days							Works are executed with interruption of traffic along the reconstructed right track during time

													interval from 10:00 pm to 05:00 am
2	Serbia	tunnel Straževica (entrance) – Jajinci – Mala Krsna (excl.) from km 9+896 to km 67+800 and Mala Krsna station	Reconstruction of the line (Belgrade) - Rakovica – Jajinci – Mala Krsna – Velika Plana	Restoration line to projected parameters	15.05.2019.	Q3 2020	Contract is signed	39,3	EBRD loan				With complete traffic interruption on the respective section. During the execution of works on the reconstruction of Mala Krsna station, traffic towards Radinac and Požarevac from the Velika Plana direction will be enabled.
3	Serbia	Sićevo - Dimitrovgrad	Civil engineering reconstruction of the Niš – Dimitrovgrad railway line	Restoration line to projected parameters	Q3 2020	Q4 2022	Preparation of tender documentation	82,4	EIB loan	WBIF grant	State		Traffic functioning and works execution will be as agreed with the Contractor (72 hours- the execution of works and 96 hours- traffic functioning)

4	Serbia	Railway bypass Nis	Civil works on construction of railway bypass Nis	Construction of new rail bypass will enable more reliable and faster rail transport through Serbia. By completion of rail bypass and electrification of Sicevo-Dimitrovgrad the change of locomotive will not be necessary.	Q2 2021	Q2 2023	Preparation of Detailed deign with tender dossier	74,2	EIB loan	WBIF grant	State		There is no impact on traffic flows.
5	Serbia	Sićevo – Dimitrovgrad with railway bypass Nis	Electrification of the Niš – Dimitrovgrad railway line	Construction of new rail bypass will enable more reliable and faster rail transport through Serbia. By completion of rail bypass and electrification of Sicevo-Dimitrovgrad the change of locomotive will not be necessary.	Q4 2021	Q4 2023	Preparation of Detailed deign tender dossier	93,5	EIB loan	WBIF loan	State		Traffic functioning and works execution will be performed alternately during time intervals that are going to be agreed with the Contractor.

BULGARIA

INVESTMENT PLAN TT 2020/2021 ALPINE-WESTERN BALKAN CORRIDOR													
	Country	**Railway section**	**Nature of Projects**	**Benefits for ABW**	**Start date of the works**	**End date of the works**	**Actual step**	**Estimation of the costs without VAT**	**Funder 1**	**Funder 2**	**Funder 3**	**Funder 4**	**Comments**
1	Bulgaria	Sofia - Elin Pelin	Modernization of railway infrastructure in accordance with the requirements to the railway infrastructure of the core TEN-T network as specified in Regulation 1315/2013	The project will improve the competitiveness of the railway line and will remove the bottlenecks	12.2016	06.2021	In process works phase	61 355 025.74 euro + inc. 2658717.78 euro unforeseen work	Approved for funding under Connecting Europe Facility (CEF)				
2.1	Bulgaria	Elin - Pelin – Kostenets Lot 1:	Modernization of railway infrastructure in accordance with the requirements to the railway infrastructure of the core TEN-T network as specified in Regulation 1315/2013	The project will contribute to eliminating the problem with the bottlenecks	05.2020	03.2026	Following a tendering procedure, the Commission is in the process of selecting a	257 566 074.02 euro +10% unforeseen work	Decision on the implementation of the European Commission (OPTTI 2014-2020)				

		km 22+554 km 42+200					contractor for construction						
2.2.	Bulgaria	Elin - Pelin – Kostenets Lot 2: km 42+200 km 62+400	Modernization of railway infrastructure in accordance with the requirements to the railway infrastructure of the core TEN-T network as specified in Regulation 1315/2013	The project will contribute to eliminating the problem with the bottlenecks	10.2019	11.2023	Following a tendering procedure, the Commission is in the process of selecting a contractor for construction	53 989 633.79 euro +10% unforeseen work	Decision on the implementation of the European Commission (OPTTI 2014-2020)				
2.3.	Bulgaria	Elin - Pelin – Kostenets Lot 3: km 62+400 km73 +598	Modernization of railway infrastructure in accordance with the requirements to the railway infrastructure of the core TEN-T network as specified in Regulation 1315/2013	The project will contribute to eliminating the problem with the bottlenecks	08.2020	12.2025	Following a tendering procedure, the Commission is in the process of selecting a contractor for construction	164 563 940.07 euro +10% unforeseen work	Decision on the implementation of the European Commission (OPTTI 2014-2020)				

3	Bulgaria	Kostenets – Septemvri	Modernization of railway infrastructure in accordance with the requirements to the railway infrastructure of the core TEN-T network as specified in Regulation 1315/2013	The project will improve the competitiveness of the railway line and will remove the bottlenecks	04.2019	12.2023	Following a tendering procedure, the Commission is in the process of selecting a contractor for construction	168 020 989.71 euro +10% unforeseen work	Approved for funding under Connecting Europe Facility (CEF)				
4	Bulgaria	Sofia – Voluyak	Modernization and upgrade of the existing double track railway section, in line with requirements for Core Network Corridors as set by Regulation 1315/2013 and repealing Decision 661/2010/EU	The proposed Action is part of the Global project that aims to remove existing bottlenecks in the Sofia railway junction by upgrading the concerned sections of the railway	01.2016	12.2024	The start of the tender procedure is significantly delayed. The decision of the tender commission was appealed to the court which returned it for reexamination	104 211 047 euro	Approved for funding under Connecting Europe Facility (CEF)				Building and engineering works designed by the contractor

5	Bulgaria	Voluyak-Petarch	Design for modernization of the existing double track railway section with requirements for Core Network Corridors as set by Regulation 1315/2013 and repealing Decision 661/2010/EU	The elaboration of DDP for the Voluyak-Petarch section - land acquisition procedure	03.2017	08.2019	Approval of the Detailed Development Plan	32 400 euro	Beneficiary's own resources of NRIC				Application Form for Financing of Technical Assistance for Preparation of Project under Priority Axis 5 "Technical Assistance"
6	Bulgaria	Petarch – Dragoman	Design for modernization of the existing double track railway section with requirements for Core Network Corridors as set by Regulation 1315/2013 and repealing Decision 661/2010/EU	The elaboration of DDP for the Petarch-Dragoman section - land acquisition procedure.	02.2015	10.2019		895 551 euro	Technical assistance for the preparation of the project (OPTTI 2014-2020)				"Preparation of a Detailed Development Plan and technical project for the modernization of a railway section

7	Bulgaria	Dragoman-Serbian border	Design for modernization of the existing double track railway section with requirements for Core Network Corridors as set by Regulation 1315/2013 and repealing Decision 661/2010/EU	Preparation of Investment Project for parts Railroad and Geodesy for Dragoman railway line - border with the Republic of Serbia	09.2018	07.2019		30 600 euro	Technical assistance for the preparation of the project (OPTTI 2014-2020)				

6.3. Deployment Plan

The European Rail Traffic Management System (ERTMS**)** is a single interoperable train control and command system in the European Union. It enhances cross-border interoperability**,** creating a seamless, EU-wide railway system. The European Union Agency for Railways (ERA) is the system authority for ERTMS**.**

ERTMS is the European standard for the Automatic Train Protection (ATP) that allows an interoperable railway system in Europe.

As an ATP, ERTMS is a safety system that enforces compliance by the train with speed restrictions and signalling status. Due to its nature and the required functions, it is a system that has to be partly installed beside the track and partly installed on board trains.

The ERTMS consists of two parts: European Train Control System - ETCS and Global System for Mobile Communications for Railways GSM-R. ETCS is used for railway safety and on-board train control. GSM-R is used for all sorts of communications in and around the train and railway track; this includes the communication necessary for ETCS to function. GSM-R thus plays a vital role in train safety.

The ERTMS European Deployment Plan (EDP) sets deadlines for the implementation of ERTMS and its aim is to ensure the progressive deployment of ERTMS along the main European rail routes.

The currently applicable EDP is included in the Commission Implementing Regulation (EU) 2017/6 of 5 January 2017 on the European Rail Traffic Management System European deployment plan.

This Regulation lays down the timetable for the deployment of the ERTMS on core network corridors (CNC) as set out in its Annex I schemes:
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0006

The implementation of ETCS on AWB RFC route is one of the basic goals set by the TSI CCS (Technical Specifications for Interoperability of Control Command System).

This ETCS is designed to eventually replace national legacy systems, imposing specific equipment on engines running on several networks. One of the main problems is building a system capable of adapting to networks whose braking and signalling philosophies and operating rules have been developed on national bases which are sometimes very different from one another.

At a technical level, ETCS Level 1 uses a specific transmission mode, eurobalises installed on tracks, to send information from track to on-board, while level 2 uses the GSM-R to exchange information bi-directionally between track and on-board. So far, Level 1 has typically been superimposed on traditional national lateral signals, while level 2 was used for new lines.

Equipping the AWB RFC with ETCS depends on national projects incorporated into national ETCS deployment strategies. These projects did not start at the same time and each project has its own planning. Once ETCS is installed, the deactivation of national legacy systems has to be decided on a country per country basis.

For the time being ETCS Level 1 is already deployed on some lines of AWB RFC route in Slovenia, Croatia and Bulgaria, as follows:

Slovenia:

- Line section Ljubljana-Zidani Most
- Line section Pragersko-Zidani Most

Croatia:

- Line section Novska-Okučani
- Line section Vinkovci-Tovarnik HR/SRB border

Bulgaria:

- Line section Septemvri-BG/TR border

To comply with the control command technical specifications for interoperability, AWB RFC continues to introduce the ECTS on its lines according to national deployment plans.

The following deployment plans related to future projects have been drafted by the IMs and include all ERTMS projects foreseen for development of infrastructure along AWB RFC. The following deployment plans could be the subject to changes and all information about planning and financing are without prejudice of each national deployment plan and European decision making.

SLOVENIA

The ERTMS deployment plan in Slovenia is as follows:

- Slovenian part of ERTMS deployment on AWB RFC is also part of old project »Deployment of ERTMS/ETCS on Corridor D«, for which the European Commission:

- with the Decision C (2008) 7888 of 10.12.2008 and in an annex to that Decision no. C (2014) 2858 of 24.4.2014 named as project no. 2007-EU-60120-P;
- with the Decision C (2010) 5873 of 20.8.2010 named as project no. 2009-EU-60122-P;
- with the Decision C (2014) 7670 of 17.10.2014 named as project no. 2013-EU-60017-P;

approved funding for the TEN-T co-financing in the Republic of Slovenia.

➢ The trackside deployment of the ETCS requested level 1 with version 2.3.0d, overlaid existing INDUSI I60 national signalling system.

➢ Current status of the projects on AWB RFC:

- line section (Zidani Most – Pragersko) – all the works were completed in 2015 and ETCS is in operation from Q2 2017;
- line section (Zidani Most – Ljubljana) – all the works were completed in 2015 and ETCS is in operation from Q2 2017;

➢ Currently is ongoing:

Deployment of ERTMS/ETCS (level 1, baseline 3-set 2_ overlaid existing INDUSI I60 national signalling system), on line section (Zidani Most – Dobova – border HR) and on line section (Pragersko – Maribor – Šentilj – border AUT), for which the European Commission approved funding for the CEF co-financing in the Republic of Slovenia with the agreement no. INEA/CEF/TRAN/M2015/1125663 for action no. 2015-SI-TM-0111-W. According to the contract with the constructor, the deadline for the end of works is Q4 2022.

- line section (st. border HR – Dobova – Zidani Most) – is now in the phase of certification of the ETCS on the section (expected completion in 2020);
- line section (Pragersko – Šentilj – st.border AUT) – is now in the phase of system designing of ETCS (expected completion in 2022);

➢ Plans till the end of 2025

- Line section Ljubljana – Jesenice – st. border AUT – expected deployment of ETCS is in 2024

➢ Bilateral meetings with HŽ-I, RFI and OBB. The main activities which to be carried out:

- coordination for establishing technical and traffic/operational rules on border section;
- preparation of Test cases from both parties which have to be put together in a single document;
- processing and entering ETCS on-board data;
- execution of test runs with locomotive equipped with appropriate on-board ETCS equipment;

➢ GSM-R:

All sections of the AWB RFC are equipped with GSM-R. The system is in operation from Q4 2017.

CROATIA

The ERTMS deployment plan in Croatia is as follows:

➢ *ETCS*

At the moment the ETCS Level 1 is deployed only on the following railway line sections:

- line section Novska-Okučani
- line section Vinkovci-Tovarnik HR/SRB border

In 2016, HŽ Infrastruktura developed a Study on the Introduction of the European Rail Traffic Management System (ERTMS), which determined the gradual development of technical documentation and execution of works, taking into account the existing state of all railway infrastructure subsystems and projects that are under implementation as well as financial resources needed for the production of technical documentation, procurement of equipment and execution of works.

Within the framework of individual contracts, documentation for the installation of ETCS Level 1 is being drafted for the:

- line section Dugo Selo – Novska
- line section Vinkovci – Vukovar

The production of documentation within which ETCS Level 2 will be designed started for the

- section Okučani - Vinkovci

Zagreb's node is in the process of being a public bid to draw up a feasibility study with conceptual solutions within which the conceptual decision of the ETCS will be given. The initial offer was on Monday 22.07.2019.

- *GSM-R*

GSM-R is not implemented on any railway line section in Croatia. The project is planned to run in the coming period, and there is plan that the GSM_R will be installed on the AWB RFC by 2030.

SERBIA

The ERTMS deployment plan in Serbia for the AWB RFC is as follows:

- line section Stara Pazova - Batajnica in the time frame 2019-2021
- line section Niš Ranžirna - Dimitrovgrad in the time frame 2020-2025
- line section Velika Plana - Lapovo, Lapovo - Stalać and Stalać - Niš Ranžirna in the time frame 2025-2030.

BULGARIA

The ERTMS deployment plan in Bulgaria is as follows:

- Kalotina Zapad-Dragoman - The ERTMS (ETCS-1 and GSM-R) deployment project is set for implementation in the Operational Program "Transport and Transport Infrastructure" in the next programming period 2021-2027;
- Dragoman-Voluyak - The ERTMS (ETCS-1 and GSM-R) project is being explored in the scope of the current programming period to 2021. Otherwise, the realization will be completed along with the project Kalotina Zapad -Dragoman in the next programming period 2021-2027;
- Voluyak-Sofia - For construction of ERTMS (ETCS-1 and GSM-R) has a selected contractor. It is expected that ERTMS will be built by 2023;
- Sofia-Septemvri - The GSM-R system is built. The ETCS-1 deployment project is set for implementation in the Operational Program "Transport and Transport Infrastructure" with a deadline of December 2023;
- Septemvri-Plovdiv - The ERTMS (ETCS-1 and GSM-R) is built;
- Plovdiv-Svilengrad - The ERTMS (ETCS-1 and GSM-R) is built;

Together with other technical differences like track gauge, electricity, voltage, rolling stock design, etc., the existence of more than 20 train control systems in Europe has always been a major obstacle to the development of international rail transport. A train crossing from one European country to another must switch the operating standards as it crosses the border. All this brings considerable operational and maintenance costs and significantly prolongs the travel time.

ERTMS aims at replacing the different national train control and command systems in Europe. The deployment of ERTMS will enable the creation of a seamless European railway system and increase European railway's competitiveness and will bring considerable benefits to the railway sector as it will boost international freight and passenger transport.

Being compatible throughout Europe, ERTMS provides the European Union with a unique opportunity to create a seamless railway system, where trains may run from Barcelona to Warsaw without facing technical problems related to signaling.

In addition, ERTMS is arguably the most performant train control system in the world and brings considerable benefits in addition to interoperability, such as:, safety, reliability, punctuality, increased capacity, higher speeds, lower production costs, lower maintenance costs, opened supply market, increased competition, etc.

By making the rail sector more competitive, ERTMS helps to level the playing field with road transport and ultimately provides significant environmental gains.

The IMs are invited to monitor the EDP fulfilement and provide the information on annual basis.

6.4. Reference to Union Contribution

AWB RFC is established thanks to the co-financing received by the European Commission. Currently, it is the recipient of the following funding awarded from the European Commission:

- Programme Support Action (PSA) (2018-2020) funding, Action No 2016-PSA-RFC10 “Support for the establishment and implementation of the rail freight corridors” - Establishment of the AWB RFC RFC 10.

The Action is a Programme Support Action in the meaning of Article 2(7) and 7(2)(j) of the CEF Regulation (EU) n°1316/2013 establishing the Connecting Europe Facility and contributes to the preparation of the following pre-identified project on the core network: Rail Freight Corridors (RFCs) established and developed in line with Regulation (EU) No 913/2010 forming the rail freight backbone of the TEN-T Core Network Corridors.

The Grant Agreement for the above mentioned Action was signed by the coordinator of all beneficiaries, Mr. Matjaž Kranjc, Director General of Slovenske železnice – Infrastruktura.

The beneficiaries are: Slovenske železnice - Infrastruktura, Slovenia, ÖBB Infrastruktur AG, Austria, HŽ INFRASTRUKTURA, Croatia and NRIC, Bulgaria. Given that this funding is intended solely for Member States, Infrastruktura - železnice Srbije is not a beneficiary since Serbia is not a Member State.

The starting date of the Action is January 1, 2018, and completion date is December 31, 2020.