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TRITIA Rail Action Plan

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Content:

1. KEY OBJECTIVES

1.1. General Objectives

The key objective of the Action Plan is to coordinate steps for tackling congested freight transport, in particular the road network in the border area of three members states of the EU in four border regions of EGTC TRITIA. One solution to this situation is to increase the region's accessibility by a railway and transfer part of the freight transport from the roads to the railways.

The main parameter for the key objectives is the required transfer of freight transport from road transport to rail transport in the range of 30% for transport distances over 300 km by 2030. It is therefore based on the White Paper of the European Union entitled: “Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system' (COM (2011) 144 final)”.

Figure 1 – Region Tritia

1.2. Models and scenarios based on the TRITIA transport model

The developed alternative scenarios (to assess the potential shift from road to rail and inland waterway transport) were tested in the TRITIA transport model for 2030, in order to

verify the impact of changes in the price of transport infrastructure charges (or a certain service - transhipment) on redistribution. traffic load (represented by a proportional number of units designated as 1 intermodal transport unit ITU - 40` ISO 1A container) between the individual transport modes.

The impact of the change was determined on the basis of the uncertainty of the development of the economy and infrastructure fees, resp. transhipment of intermodal transport units between different transport modes. The basic parameters entering into the testing of the impact of changes on the change in the division of transport work are:

- change in GDP,
- change of charges for the use of road infrastructure (tolls),
- change in charges for the use of railway infrastructure,
- change of transhipment fees.

The definition of alternative scenarios was based on testing the potential development of the GDP economy that may occur. Subsequently, the creation of individual alternative scenarios and their variants, which are:

1. S0: Assessment of economic development parameters - GDP
   - Pessimistic scenario - this scenario is characterized by a low trend in economic development.
   - Realistic scenario - the scenario is characterized by medium economic development
   - Optimistic scenario - The scenario can be evaluated with a high degree of economic development.
2. S1: Road transport - increase and decrease in the price of infrastructure charges
3. S2a: Rail transport - increase and decrease in the price of infrastructure charges and transhipment charges
4. S2b: Rail transport - increase and decrease in the price of the infrastructure charge
5. S3: Water transport - increase and decrease in transhipment prices
6. Combined scenario: Increase in the price of the toll for the use of road infrastructure, railway infrastructure and the price for transhipment

The first level of alternative scenarios is the economic scenario "S0", which is defined by three variants, where pessimistic GDP growth (growth + 10%), realistic GDP growth (growth + 15%) and optimistic GDP growth (growth + 20%) are considered. In other alternative scenarios "S1", "S2a / S2b", "S3" and "Combined", the change in the redistribution of the number of intermodal transport units between individual transport modes was investigated by simulating the change of infrastructure and transhipment charges in individual transport modes, resp. combinations thereof.
Scenarios „S1“, „S2a / S2b“ and „S3“ are processed for realistic development of GDP (growth 15%), while change of fees for use of infrastructure and transhipment was considered with change of ± 5%, ± 10%, resp. ± 20% (water transport). The “Combined” scenario also considers the realistic development of GDP + 15%, although it combines various changes in the price of fees for the use of transport infrastructure, resp. prices for transhipment as follows: toll + 10%, railway + 5%, transhipment + 20%. In the following

table provides a detailed list of scenarios and their variants that have been tested within the transport model.

Table 1 (9 from D.T3.2.2). - Scenarios and variants considered in the transport model

Scenár	Variant
S0	Growth HDP +10%
	Growth HDP +15%
	Growth HDP +20%
S1	Road infrastructure charges (toll) increase by + 5%
	Road infrastructure charges (tolls) decrease by -5%
	Road infrastructure charges (toll) increase by + 10%
	Road infrastructure charges (tolls) decrease by -10%
S2a	Railway infrastructure charges + transhipment costs + 5% network increase + 10% transhipment
	Railway infrastructure charges + transhipment costs decrease by -5% network -10% transhipment
	Railway infrastructure charges + transhipment costs + 10% increase in network + 20% transhipment
	Railway infrastructure charges + transhipment costs decrease by -10% network -20% transhipment
S2b	Railway infrastructure charges increase by + 5%
	Railway infrastructure charges decreased by -5%
	Railway infrastructure charges increase by + 10%
	Railway infrastructure charges decrease by -10%
S3	Transhipment fees in water transport terminals increased by + 10%
	Transhipment fees in water transport terminals reduced by -10%
	Transhipment fees in water transport terminals increased by + 20%
	Transhipment fees in water transport terminals reduced by -20%
Combined	Toll + 10%, railway + 5%, transhipment + 20%

The definition of the toll rate was based on current rates, which in the alternative scenarios were changed between ± 5% and ± 10% compared to the current toll rate, thus covering a sufficient price range. The basic toll rate used in the transport model is 0.19048 € / km. The fees for the use of railway infrastructure were also based on the current fees and in alternative scenarios the redistribution of IPJ between individual transport modes was simulated.
The change in railway infrastructure charges ranged between ± 5% and ± 10% compared to the current rate. In the transport model, the rate of 0.1084 € / km was considered. When defining the fee, we used a reference train, which represented 20 wagons. There is no charge for the water network infrastructure. The price of transhipment in terminals has a fundamental influence on the use of the waterway, which also has an impact on the use of the railway network. The following table shows the fees for

transhipment of a 40-foot container at national terminals. Prices were determined based on whether the container was empty or loaded.

In some cases, prices did not differ between loaded and empty containers. This is because handling fees have been charged regardless of whether the container is empty or loaded. The current prices of IPJ handling are lower than those considered. In the transport model for 2030, a transhipment price of € 40 was considered. This is due to the expected growth of economic development. In alternative scenarios that simulated ± 10% and ± 20% changes in loading and unloading fees, a sufficient price range was covered.
In the transport model, an intermodal transport unit is considered, represented by a 40´ container. These intermodal transport units can be used in any mode of transport (road, rail, water). For intermodal transport units, a resistance is defined for each traffic mode based on the resistance function defined below.

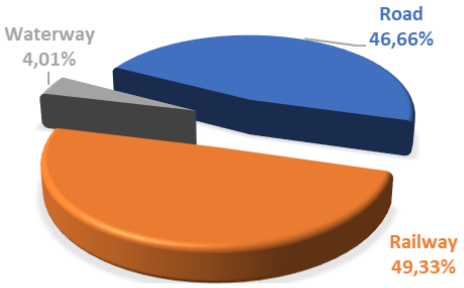
Table 2 (10 from D.T3.2.2) - Transhipment fees in monitored EU countries

40 feet container					
Country	Počet TIP	Loaded		Empty	
		Minimum	Maximum	Minimum	Maximum
Slovakia	9	28	35	28	35
Czechia	16	22,5	30	22,5	30
Hungary	11	30	42	25	42
Germany	10	23	40	23	40
Poland	28	18,3	41	18,3	38
Austria	20	28	33	28	33
Italy	16	32,5	32,2	32,5	32,5
Average	-	26,04286	36,21429	25,32857	35,78571

Within the S0 scenario, a change in the level of economic growth of + 10% (pessimistic scenario), + 15% (realistic scenario) and + 20% (optimistic scenario) was considered. The split mode of the potential transfer of cargo (containers) for individual modes of transport is shown in a graphical representation:

Figure 2 – Example illustration of the division of transport work of a potential transfer in 2030 (Scenario S0)

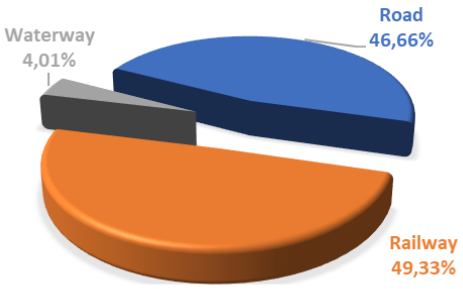
GDP growth +10%



Performance in container kilometer

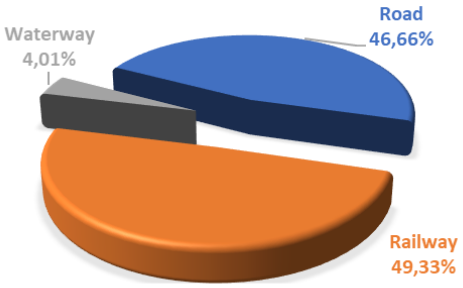
Road:	5 599 502
Railway:	5 920 472
Waterway:	480 792

GDP growth +15%



Performance in container kilometer	
Road:	5 854 025
Railway:	6 189 584
Waterway:	502 646

GDP growth +20%



Performance in container kilometer	
Road:	6 108 547
Railway:	6 458 696
Waterway:	524 500

1.2.1. Bottle necks

After redistributing the total potential of the transport load on the infrastructure of other transport modes, its capacity parameters were analyzed in order to identify bottlenecks. In the case of inland waterway infrastructure, no overcapacity was identified. For railway transport, the assessment was carried out by comparing the technical capacity of individual sections with the level of modeled load, while rail passenger transport also contributed to this load.

Railway sections with an occupancy rate of at least 70% were considered to be bottlenecks. Despite the fact that the sections with the usability of the railway line at the level of 70% to 80% do not exceed the capacity possibilities, in practice for these sections it is usually already considered at this stage to implement the necessary measures in the medium or long term. Narrow places where the line utilization of more than 80% has been identified, it is necessary to look for suitable measures and implement them in the short term.

However, the most pressing are considered to be the railway sections, the capacity of which would be exceeded at zero in the case of a potential shift of traffic load from road transport to zero in 2030. In these cases, the necessary infrastructure measures freight transport by road in line with the common direction of transport policy.

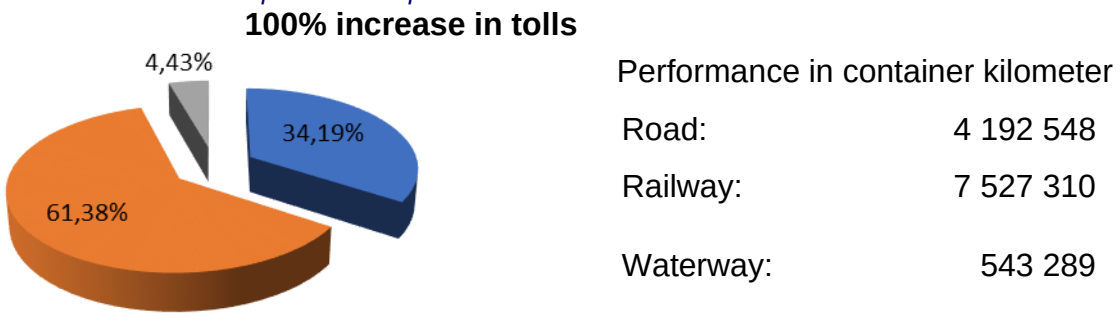
Table 3 (10 from D.T3.2.2) - Bottlenecks on the railway infrastructure after redistribution of transport load in zero scenario /2030/

Priority	ID	Section name	Tracks (number)	Capacity (Number of trains/week) (2030)	Number of passenger trains/week (2030)	Number of freight trains/week (2030)	Number of containers/ day (2030)	Number of container trains/day (2030)	Number of container trains/week (2030)	Number of total trains/week (2030)	Occupancy rate (%) (2030)
1	PL131-5	Herby Nowe - Kłobuck	2	511	0	419	794	40	280	699	136,8%
2	SK05-C	Diviaky - Vrútky	2	1106	312	218	2759	138	966	1496	135,3%
3	PL139-2	Tychy - Pszczyna	2	1015	588	250	1457	73	511	1349	132,9%
4	PL139-1	Katowice Ligota - Mąkołowiec	2	1484	1141	218	1457	73	511	1870	126,0%
5	CZ301A-5	Třinec – Český Těšín nákl. nádr.	2	1687	568	611	2429	122	854	2033	120,5%
6	PL131-4	Strzebiń - Kalina	2	735	98	419	794	40	280	797	108,4%
7	PL131-2	Radzionków - Tarnowskie Góry	2	1029	238	516	794	40	280	1034	100,5%
8	CZ301A-1	(SK) st. border - Mosty u Jabl.st. border	2	1554	294	381	2429	122	854	1529	98,4%
9	PL131-1	Chorzów Stary - Bytom Północny	2	791	238	210	794	40	280	728	92,0%
10	PL131-3	Tarnowskie Góry - Zwierzyniec	2	966	322	451	257	13	91	864	89,4%
11	CZ301A-4	Bystřice n. Olší – Třinec	2	1967	550	327	2429	122	854	1731	88,0%
12	CZ301D-2	Odb. Chotěbuz – Albrechtice u Č.Těšína	2	1421	478	390	839	42	294	1162	81,8%
13	CZ305B-9	Jistebník - Studénka	2	2373	1090	786	149	8	56	1932	81,4%
14	CZ301A-2	Mosty u Jabl.st.hr. – Návsí	2	2135	450	380	2429	122	854	1684	78,9%
15	CZ301A-3	Návsí – Bystřice n. Olší	2	2338	540	380	2429	122	854	1774	75,9%
16	PL136	Opole Groszowice - Kędzierzyn-Koźle	2	637	112	339	76	4	28	479	75,2%

1.2.2. Measures

Due to the fact that the above scenarios according to Table 1 in Chapter 1.1 set by the model did not show significant differences in the division of transport, a scenario was completed for the needs of part of the WP2 project, where road network charges were doubled to determine whether it is significant. propose a leveling of charges roughly to the level of Austria, ie doubling.

Figure 3 - Division of transport work of potential transfer in 2030



Based on the above graph, it is clear that when the fees are doubled compared to the present, the share of rail transport is already increasing from 50% to 61%.

1.2.3. Lines/sections

Due to the fact that the transport model worked in the exits only with traffic passing through border crossings, a balance sheet was carried out, which considers all road lorries. For the distribution of traffic over 300 km and up to 300 km, the values obtained by questionnaire surveys were used.

Table 4 - Percentage of vehicles with a route over 300 km

Border crossing	Trucks overall	Border crossing	Procentuální podíl nad 300 km
SK/PL - Trstená	1134	565	49,84%
SK/PL - Skalité	959	770	80,28%
SK/CZ - Mosty	3316	2471	74,50%
SK/CZ - Bílá	1273	874	68,72%
CZ/PL - Chotěbuz	3512	2144	61,03%
CZ/PL - Antošovice	6754	3683	54,53%
CZ/PL - Bartultovice	919	555	60,39%
Overall	17 867	11 062	**61,91%**

Using the values from the automatic counters according to the output D.T3.2.3, the increases in the number of trains on individual lines due to the transfer of traffic from road to rail were determined. No consideration is given to the transfer of traffic to lines which are not technically adapted to this, in particular the gradients, conditions and useful length of the tracks, and at the same time no adjustment is being made to them.

Table 5 - Assessment of the increase in the number of railway infrastructure trains for the transition between modes of transport for 2030

Line	Section	Source table from D.T3.1.3	Average day trucks 2020 in both dirrections	Growth koeficient 2030/2020	Average day trucks 2030	Share of vehicles with a route over 300 km	Shift of 30% of vehicles over 300 km (White Paper EU paragraph 2.5 (3))	Number of 40'' per train	Number of new freight trains in 2030
A	B	C	D	E	F	F	F	F	G
				note 2	DxE		Ex0,3xI		F/G
jihozápad - Ostravsko	Studénka - Ostrava	68	5511	1,37	7550	62%	1402	40	35
	Rychaltice - Frýdek-Místek	70	2302	1,37	3154	62%	586	40	15
	Dětřichov - Krnov	74	852	1,37	1167	62%	217	40	5
Sum for line section	Suchdol nad Odrou - Ostrava								55
Bohumín – border CZ /SK	Jablunkov - Mosty	69	2983	1,37	4087	62%	759	40	19
border CZ/SK - Žilina	Čadca - Krásno nad Kysucou	151	3880	1,37	5316	62%	987	40	25
	Dolný Kubín - Tvrdošín	154	1181	1,37	1618	62%	301	40	8
Sum for line section	Žilina - Čadca								32
Žilina - západ	Žilina - Bytča	153	6231	1,37	8536	62%	1585	40	40
Žilina - jihovýchod	Strečno - Dubná Skala	152	4962	1,37	6798	62%	1263	40	32
	Rajec - Fačkov	155	232	1,37	318	62%	59	40	1
Sum for line section	Žilina - Vrútky								33
	Ivachnová - Liptovský Mikuláš	152	3688	1,37	5053	62%	938	40	23
Bohumín - Katowice	Bohumín - Mszana	106	4681	1,37	6413	62%	1191	40	30
	Tychy - Pszczyna	110	5553	1,37	7608	62%	1413	40	35
	Zory - Skoczow	117	1910	1,37	2617	62%	486	40	12
Sum for line section	Tychy - Katowice								77
Cieszyn - Bielsko-Biala	Cieszyn - Bielsko-Biala	108	3411	1,37	4673	62%	868	40	22
Sum for line section	Dětmarovice – Czechowice-Dziedzice								99
Bohumín - Opole	Racibórz - Krapkowice	111	905	1,37	1240	62%	230	40	6
Opole - Katowice	Gliwice - Katowice	105	21915	1,37	30024	62%	5576	40	139
	Opole - Gliwice	105	13486	1,37	18476	62%	3432	40	86
Katowice - sever	Siewierz - Częstochowa	110	7389	1,37	10123	62%	1880	40	47

Notes:

1. *The equivalent of a 40 ”container is considered for a truck*
2. *The growth coefficient is according to table 9 from D.T3.2.2*
3. *Number of trucks according to table D.T3.1.3*

The values from the above table are added to the values in the tables WP3 - Railway section capacities, which are previously increased by a coefficient of 1.37. If the load exceeds 80% in some sections, adjustments are proposed to increase capacity.
The transfer of traffic and the creation of capacity bottlenecks occur mainly on the main routes, which are already part of the TEN-T and RFC networks. As a result, it is not necessary to expand these networks. In terms of time, however, it should be noted that all investments must be given the highest priority, because with an average length of preparation and implementation of investments of about 15 years, all required constructions should be in preparation, both constructions that are already in planning documents. individual states, as well as constructions proposed by the TRANS TRITIA project for completion. An example is the reconstruction of the Ostrava junction, where, according to current plans, the bottleneck will not be removed until 2035, which is beyond the horizon set by the EU White Paper, and it is a construction being prepared since 2011.

1.3. Removal of major obstacles

1.3.1. Railway infrastructure

The tabular listing of buildings is made in Chapters 2, 3 and 6, justifying the comment in Chapter 5.

1.3.1.1. Czech republic

Based on the output from the model (Chapter 1.2.1) and the increase in traffic according to Table 5, the following sections are insufficient capacity for the railway's performance in 2030:

- Insufficient permeability of the Přerov - Ostrava - Bohumín - Chalupki line
- Exit from the Havířov and Paskov terminals in the direction of Poland only along the single-track Polanecká junction in the section Odra branch - Ostrava Svinov. In the case of the terminal in Paskov, this is also the only exit to Slovakia.
- Missing connection to the south from the Mošnov terminal under construction
- Insufficient capacity of the Čadca - Mosty u Jablunkova - Třinec line

1.3.1.2. Poland

Based on the output from the model (Chapter 1.2.1) and the increase in traffic according to Table 5, the following sections are insufficient capacity for the railway's performance in 2030:

- Herby Nowe – Kłobuck
- Tychy – Pszczyna
- Katowice Ligota – Mąkołowiec
- Strzebiń – Kalina
- Radzionków - Tarnowskie Góry - Zwierzyniec

- Opole – Gliwice – Katowice – Trzebinia

This is a section with the highest potential of up to 139 trains per day for the transfer of traffic, which cannot be solved by a simple reconstruction of the existing line. There are 2 variants of the solution, namely triple-railing of the existing line or reconstruction, including double-railing and electrification on parallel routes.

1.3.1.3. Slovakia

Based on the output from the model (Chapter 1.2.1) and the increase in traffic according to Table 5, the following sections are insufficient capacity for the railway's performance in 2030:

- Vrútky – Diviaky
- Vrútky – Žilina
- Žilina – Bytča

The question is the solution of the entire route Hungary - Poland via Slovakia, because there is no continuation north or south with sufficient capacity. In addition, this route is disqualified by a long section with slopes above 8 ‰ when crossing mountain ranges both south and north, and trains currently use the Hungary - Poland route with a detour through Břeclav and Přerov in the Czech Republic, where it is possible to pass one interoperable locomotive due to lack of large climbing and restricting tunnels.

1.3.2. Legislative issues

Crossing borders issues

Rail transport remains the last mode of transport when it is not possible to drive a means of transport in another state with the right to drive a means of transport in one state. Large carriers can deal with the problem, but smaller carriers have an administrative and pricing problem. The situation needs to be clarified at least at the bilateral level, so that the change of train drivers on trains can take place within territories with higher populations and not at borders where unproductive times for self-transport arise for the workforce.

Ad-hoc freight trains

Obtaining an ad-hoc route for carriers does not mean any advantage and from the reports on individual corridors it is possible to deduce the use of these routes at the level of about 10%. It is necessary to make such adjustments that carriers can lead trains with guaranteed timetables via AD-HOC routes, which will be incorporated into price offers. Due to the fact that the individual administrations interrupt the ordered routes, for example due to exclusions, the AD-HOC routes do not yet fulfill their purpose. It is often more advantageous to deal with individual railway administrations and not through the contact point of SŽ, s.o. (in relation to RNE Europe), a route with a more advantageous useful train length is obtained, for example.

On the other hand, paradoxically, the cooperation between Czech and Polish carriers does not work well, for example when submitting applications for ad-hoc routes for the same international freight trains that cross borders. PKP PLK and ŽS, s.o. they have different conditions regarding the possibility of running a train in time after the approval of its ad-hoc route. In addition, Polish carriers pay for the booked routes, and if they do not use them, it is an unnecessary cost for them. Therefore, requests for routes are submitted later than

Czech carriers, only when they have a locomotive and know the composition of the train, staff, etc. Czech carriers pay for actually implemented trains and not for ordered routes, so they can submit ad-hoc requests more in advance.
From the statistics of SŽ, s.o. from 2019 on the number of freight trains through PPS Petrovice u K. / Zebrzydowice and Bohumín-Vrbice / Chałupki and Mosty u Jablunkova / Čadca it follows that through PPS Petrovice u Karviné carriers use mainly ad hoc routes (they make up 3/4 of the total Only 1/3 of the routes to the annual JR are in the Bohumín-Vrbice TSO in 2019, the number of ad hoc routes and to the annual JR was almost balanced, in the Mosty u Jablunkova TSO the number of ad hoc routes number means that it is less than half.
It is necessary to make such adjustments that carriers can run trains with AD-HOC routes with a guaranteed timetable, which will be incorporated into the price offers. In order to harmonize the deadlines for the submission of applications by carriers for ad-hoc routes operating the same trains and at the same time approved as soon as possible.

1.3.3. Operation organization

Cross-border stations
The focus of the main regular trains in railway transport is at border crossing stations. The situation is caused by poor cooperation, especially of small Czech and Polish carriers, who do not pass on information in time about the positions of their trains on the network and the exact times when it is necessary for locomotives for overhangs to be available at border crossing station Petrovice u K. / Zebrzydowice and Bohumín-Vrbice / Huts. For this reason, trains do not pass smoothly through the TSO and large delays of several hours occur at these stations. From the statistics of SŽ, s.o. of 2019 on the delay of freight trains in border crossing station at the entrance and exit between the network SŽ, s.o. and PKP PLK and further between the network of SŽ, s.o. and ŽSR and the number of trains of the Nex and Pn categories that cross the border, huge delays are evident, especially in border crossing stations Bohumín-Vrbice, Petrovice u K., but also in border crossing station Mosty u Jablunkova.
Significantly complicate the operation in border crossing station especially Polish trains, for which it is only in border crossing station that it is found in the train that the cars are unfit for operation (repair cars), which need to be excluded from these trains, which causes further delays in PPS (need for locomotives to shift and own shifting work).
Due to the fact that it is paid for stays in border crossing station on the PKP PLK network, in the period before the holidays there are situations where all carriers try to get their trains to the SŽ, s.o. Network, where they do not pay for their stays. This leads to uneven accumulation of trains in Czech TSOs. In the future, charging for stays in Czech border crossing stations is also planned (SŽ, s.o. Is now evaluating a pilot project).
As a rule, the problems do not concern the border between the Czech Republic and Slovakia. With the advent of interoperable locomotives and ETCS, the problems at border stations are expected to gradually disappear. An unsolved problem on the Polish side is the conversion of the power supply system from 3 kV DC to 25 kV AC, which may create a barrier at the borders by 2030.

Irregularities in transport
Within the states, transport problems are not solved at all at the time of closures, losses in freight transport are not calculated for constructions, because trains simply stop and the whole loss is borne by the carrier. No one is forced by the builder to carry out construction

measures so that the carriers can maintain the time sequence and comply with their business obligations. It is necessary to determine exhaustively already in the project how freight train transits will be solved, without the traffic stopping. It is not possible to draw up an elimination order on the main lines in such a way that some trains simply will not run or will wait for hours and will not have an equivalent alternative route. Similarly, although in a simpler form, it works in road transport.

Dispatch control

The experience of carriers shows that especially in the Czech Republic there is a long delay in freight trains, which is often unnecessary, because it is calculated with other dynamic parameters than the real ones, which, for example, reduces the average speed by about 20 km / h compared to Austria.

SŽ, s.o. installed within the information system (IS) for train traffic management functions that are directly related to the current state of European implementation of Commission Regulation (EU) No. 1305/2014 TAF-TSI (Regulation amended under No. 2019/778), eg connection to common lists of central codes and the use of a common European interface, connection to the central information system RNE TIS (Train Information System) for monitoring international trains or completion of TAF-TSI functionalities in the management operating system, as well as elaboration of basic and operational traffic planning.

Due to insufficient application of the above-mentioned EU Commission Regulation in information systems used for traffic management (concerning requests for train paths, preparation before train departure and its own journey) on ŽSR lines and especially PKP PLK there is infrastructure manager SŽDC, ŽSR and PKP PLK discrepancy in the capacity allocation and the life cycle of the allocated route. For example, on the network of SŽ, s.o. it is possible to run trains with the possibility of deviations in the time frame -3 h / +20 h from the regular time. In neighboring states - on the PKP PLK and ŽSR networks it is different. Other reasons are modifications of regular train routes due to closures, diversions, etc. On the network of SŽ, s.o. Thanks to the consistent application of EU regulations concerning TAF TSIs, they are "forced" to replan routes in traffic management, ie to refine them more precisely, and then it may happen that different solutions to these problems on the ŽSR and PKP PLK network in border crossing stations (TSOs).

PKP PLK have not yet sufficiently applied the above-mentioned EU regulation to their information system for train traffic management and for this reason it is not possible to quickly transfer information for cross-border traffic management to IS SŽ and IS ŽSR concerning train positions on PKP PLK network, their probable arrival to PPS, trains, etc. Information on the composition of Czech and Slovak trains, for example in PPS Zebrzydowice, is entered into the IS PKP PLK only after the arrival of these trains in the Polish PPS.

The processing of requests for train paths and timetables is also hindered by the inconsistent conditions of PKP PLK and SŽ, s.o. and also ŽSR (concerning the period of validity of routes, etc.) as well as poor cooperation of small Czech and Slovak carriers with their partners in Poland.

1.3.4. Current proposals for investment in transport network by states

The proposal for investments in transport infrastructure is elaborated in detail within the TRANS TRITIA project as a basis for the transport model in output D.T3.2.2 - Report on the zero scenario of TRITIA transport model and in chapter 6 of output D.T2.2.1.

In general, it can be stated that, with a few exceptions, these are simple reconstructions, where there are no increases in capacity for rail freight. The capacity is slightly increased only by converting the voltage system from 3 kV DC to 25 kV-50 Hz AC on the route Vrútky - Žilina - Čadca - Třinec or by installing a GSM-R security device. The only exceptions are the reconstruction of the Ostrava junction and the construction of the Přerov - Ostrava high-speed line. However, these two investments will not be in operation until the key year 2030.
The main benefit in most cases is only that it will not be necessary to introduce additional slow runs due to the condition of the railway line or to remove some already established slow runs. Increasing the speed to 160 km / h as part of the planned reconstruction of the existing network increases the difference between faster passenger and slower freight trains and thus reduces the capacity of freight lines, in addition to reducing the number of tracks, their useful length and eliminating parallel connections for current train rides. **A document dealing with the identification and elimination of bottlenecks based on the transfer of 30% of traffic over 300 km by 2030 has not been produced in any country of the TRITIA region.**

1.3.5. Other inputs

For the purpose of evaluating the state of how the costs of states in road and rail transport are applied to the fees that are collected using the transport route, a clear table has been prepared.
The main output of the table is to calculate whether road and rail freight transport is charged equally when transporting a certain unit, which in this case is one tonne.

Table 6 – Comparison of charges for road and rail transport

Country	Highway charges [euro/km]	Main road charges [euro/km]	Diesel tariffs [Euro/liter] - year 2019	Consumption liter/100 km	Diesel tariffs [Euro/km]	Charged state costs road[euro/km]	Load tonnage/truck	Charged road state costs [euro/tonekm] - year 2019	Charged railway network lenght [km]	Charged road network lenght [km]	Conversion factor	Railway charges [euro/train] - year 2013	Load tonnage/train	Charged railway state costs [euro/tonekm]	Price compared with road	Externality difference road - railway [euro/tonekm]	Road freight donation compare to train [euro/tonekm]		Train 1800 tone	Notes
A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S	T			
					D/E	B+F		G/H			K/L			N/O	PxM	44-5	I-R-S			
Austria	0,419		0,410	30	0,123	0,542	25	0,022	4917	2200	2,2	3,2	700	0,005	0,010	0,039	-0,028		4,31	
Croatia	0,223		0,412	30	0,124	0,347	25	0,014					700	0,000	0,000	0,039	-0,025			
Czech	0,174	0,083	0,431	30	0,129	0,303	25	0,012	9463	1215	7,8	3,4	700	0,005	0,038	0,039	-0,065		4,59	
France	0,300		0,610	30	0,183	0,483	25	0,019	30013			1,7	700	0,002	0,000	0,039	-0,020			
Germany	0,198	0,000	0,470	30	0,141	0,339	25	0,014	33380	51000	0,7	2,7	700	0,004	0,003	0,039	-0,028			
United Kingdom	0,000		0,662	30	0,199	0,199	25	0,008	16241			1,9	700	0,003	0,000	0,039	-0,031			truck only M6 and some bridges and tunnels
Greece	0,350		0,421	30	0,126	0,476	25	0,019				1,1	700	0,002	0,000	0,039	-0,020			
Hungary	0,492	0,307	0,363	30	0,109	0,601	25	0,024				2,1	700	0,003	0,000	0,039	-0,015			
Italy	0,210		0,617	30	0,185	0,395	25	0,016	16788			2,4	700	0,003	0,000	0,039	-0,023			
Macedonia	0,101		0,194	30	0,058	0,159	25	0,006					700	0,000	0,000	0,039	-0,033			
Nederland	0,000		0,498	30	0,149	0,149	25	0,006				2,5	700	0,004	0,000	0,039	-0,033			truck only some bridges and tunnels
Poland	0,062		0,347	30	0,104	0,166	25	0,007	18429			3,0	700	0,004	0,000	0,039	-0,032			
Romania	0,036		0,394	30	0,118	0,154	25	0,006	10766			3,3	700	0,005	0,000	0,039	-0,033			truck for 300 km
Serbia	0,150		0,457	30	0,137	0,287	25	0,011					700	0,000	0,000	0,039	-0,028			
Slovakia	0,217	0,168	0,416	30	0,125	0,342	25	0,014	3626			2,8	700	0,004	0,000	0,039	-0,025		2,17	
Slovenia	0,514		0,502	30	0,151	0,664	25	0,027					700	0,000	0,000	0,039	-0,012			
Switzerland	0,484	0,484	0,759	30	0,228	0,712	25	0,028	5323	1764	3,0	1,0	700	0,001	0,004	0,039	-0,015			for lorry 18 tonne

Source: https://www.tolls.eu
Source: https://www.fuelseurope.eu/knowledge/refining-in-europe/economics-of-refining/fuel-price-breakdown/ - March 2018
Source: https://www.railtech.com/infrastructure/2018/04/10/european-track-access-charges-international-freight-more-or-less-harmonised/?gdpr=accept
Source: https://www.eca.europa.eu/Lists/ECADocuments/SR16_08/SR_RAIL_FREIGHT_EN.pdf

The previous table shows:

- Rail transport is disadvantaged by charging for the entire network, while road transport is charged only in some sections, the extent of charging is weak, especially in Poland.
- Even when the excise tax is taken into account, the road charging does not reach a sufficient level to approach the values of the charging of a comparable transport unit for rail transport.
- The introduction of new engine system for trucks will gradually reduce the importance of fuel excise duty and the deficit, and the gap between rail and road charging will widen further. New engine systems will reduce trucking costs by up to 20%.
- Low price of charging in the states of the TRITIA region compared to most Western European countries - usually at half and lower value.
- In view of the values from the previous outputs of WP2, it is not logical for road transport to have an overall lower charge than rail transport, although it imposes higher external and direct costs on states.

2. PRIORITIZATION OF INVESTMENTS FOR IMPLEMENTATION

The sections of the lines in the following chapters do not coincide in all cases with the sections of the proposed structures. For example, the construction of the Žilina junction extends into two sections Bytča-Žilina and Žilina - Vrútky.

- By 2030, it is necessary to comply with all planned investments according to output D.T3.2.2. Table 3 and Table 4.
- It is also necessary to solve insufficient capacity according to D.T3.2.2 table 10 and tables D.T3.2.3 in chapter 2.1.1. For 2020 values, it is necessary to multiply by a growth coefficient of 1.37 and add trains created by transfer from the road network from Table 5.
- Beyond investments according to output D.T3.2.2. Table 3 and Table 4, the following additional measures must be taken on the railway network for the necessary transfer of traffic or the deadline must be postponed for the following planned constructions:

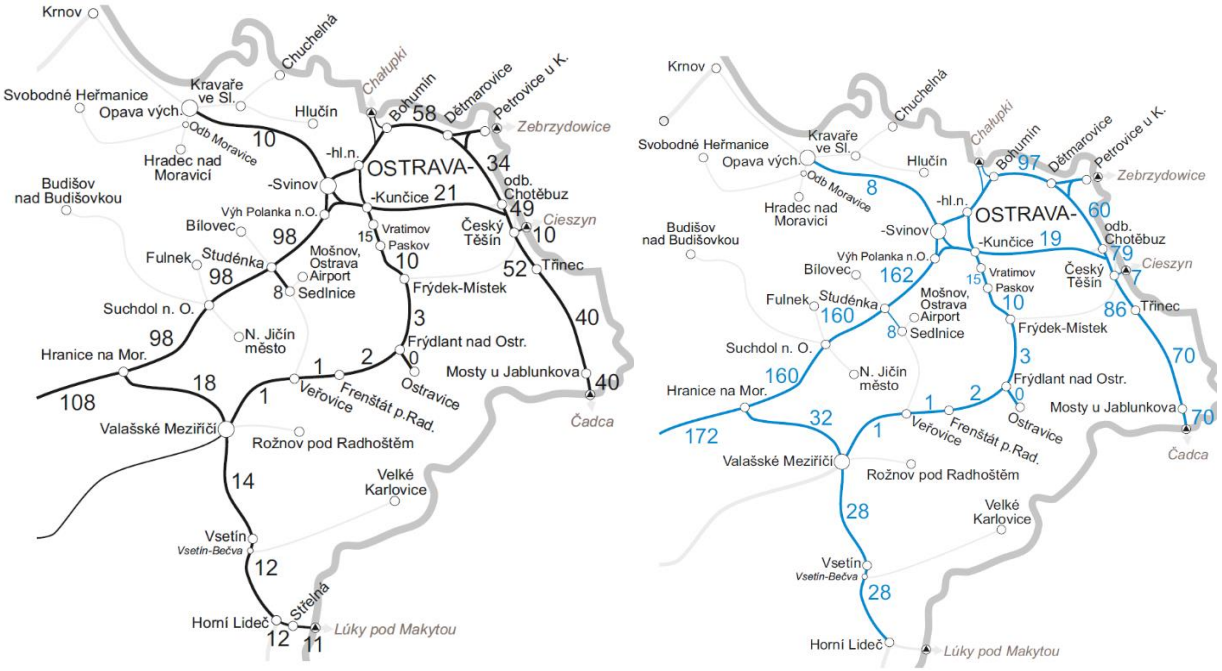
2.1. Czech republic

The main route passing through the Moravian-Silesian Region is the RFC 5 Baltic-Adriatic corridor. This route passes in two variants, namely the Moravian Gate (Přerov - Ostrava) and the Jablunkov Pass (Žilina - Bohumín). From the point of view of the advantage of the route for railway freight carriers, the route through Moravská brána is preferred at comparable starting and destination points, because it is more inclined, one border crossing simpler and currently cheaper due to transport charges. This causes and will naturally cause higher pressure on the use of this route in the axis Vienna - Katowice and on this basis the prioritization of constructions is chosen.

Figure 4 - The comparison of long distance railway routes from Hungary to Poland.

Source – ŽESNAD

Figure 5 – Numbers of freight trains in the northeastern part of the Czech Republic in 2018 and 2035



Source – Správa železnic

It is necessary to emphasize that the occupancy levels of individual lines in the Moravian-Silesian region, which exceed the reliable limit of 80%, are, according to the output of D.T3.1.4, already in the current state as of 2019:

Table 7 – Sections with insufficient capacity on the railway network in the Moravian-Silesian region

No:	Sections according to the table 10 z D.T3.2.2	Occupation	Is solved by the construction
2	Hranice ČR/SR - Chotěbuz	80-120%	Conversion of power supply systém from 3 kV dc to 25 kV-50 Hc AC and signaling systém ETCS
No:	Sections according to the table 3 z D.T3.2.3 including an increase to 2030	Occupation	Is solved by the construction
1	Polom - Ostrava	130%	High speed line Přerov – Ostrava, Increasing the capacity Přerov - Ostrava
3	Ostrava - Bohumín	120%	Reconstructio nof Ostrava node
4	Pudlov - Chalupki	125%	Increasing the capacity Pudlov - Chalupki
5	Ostrava Kunčice – Frýdek-Místek	110%	Electrification and Doubling of tracks Ostrava – Frýdek-Místek
6	Český Těšín – Ostrava-Kunčice	80%	Conversion of power supply systém from 3 kVdc to 25 kV-50 Hc AC and signaling system ETCS
7	Ostrava-Vítkovice – Ostrava-Svinov	80%	Increasing the capacity switch Odra – Ostrava Svinov

Note: The order of constructions in the table corresponds to the order of priorities of the solution of key sections

2.2. Poland

All identified bottlenecks in cross-border freight are characterized by low capacity. They are part of the international TEN-T transport network. It should be noted, however, that investment projects are already being implemented as part of the identified bottlenecks, or these projects are planned for implementation. It is recognized that these projects have the highest priority for investment implementation.

Table 8 – Sections with insufficient capacity on the railway network in the Opole and Silesian voivodeships

No:	**Sections according to the table 10 z D.T3.2.2**	**Occupation**	**Is solved by the construction**
1	Herby Nove - Klobuck	136,8%	Modernization of section Klobuck - Chorzów
3	Tychy - Pszczyna	132,9%	Modernization of section Katowice – Zebrzydowice Vysokorychlostní trať Katowice - Ostrava
4	Katowice Ligota - Mąkołowiec	126%	Modernization of section Katowice - Zebrzydowice
5	Strzebiń - Kalina	108,4%	Modernization of section Klobuck - Chorzów
6	Radzionków – Tarnowskie Góry - Zwierzynec	100,5% - 89,4%	Modernization of section Klobuck - Chorzów
7	Chorzów Stary - Bytom Północny	92%	Modernization of section Klobuck - Chorzów
No:	**Sections according to the table 3 z D.T3.2.3 including an increase to 2030**	**Occupation**	**Is solved by the construction**
2	Opole Groszowice – Kędzierzyn - Koźle – Katowice - Trzebinia	75% - 130%	Increasing of capacity Opole - Katowice - Krakow
8	Zebrzydowice - Czechowice-Dziedzice	80%	Modernization of section Katowice – Zebrzydowice High.speed of Katowice - Ostrava

Note: The order of constructions in the table corresponds to the order of priorities of the solution of key sections

2.3. Slovakia

The issue of solving the capacity of lines in the Žilina region is the solution of the entire route Hungary - Poland through Slovakia, because there is no continuation to the north or south with sufficient capacity and suitable technical conditions. This route is disqualified by a long section with slopes above 8 ‰ when crossing mountain ranges both south and north. Trains currently use the Hungary - Poland route with a detour through Břeclav and Přerov in the Czech Republic, where it is possible to pass through one interoperable locomotive due to the absence of large climbs and restrictive tunnels (see Figure 4).

Most of the lines concerned are of international importance in passenger as well as in the freight transport. Two lines are currently of lesser significance then in the past, namely Čadca - Skalité (Zwardoň) and Vrútky - Zvolen. The line through Skalité has lower volumes than in the past, but it has a great potential in terms of future growth, because it is included in TEN-T core network and the possibilities of a redundant railway line in the region providing sufficient capacity for future growth in rail transport due to the continuous increase in the number of passenger trains on the line Žilina - Ostrava. The Vrútky line is of particular importance for passenger transport, but it also has sufficient capacity for creating an efficient north - south connection for freight and at the same time, it can serve as an alternative connection for the Žilina - Trenčín / Leopoldov / Bratislava route.

The alternative interconnection is particularly important in freight transport, which does not have such high sensitivity to the travelling time as the passenger transport. The use of an alternative freight routing may be important because of growth of the passenger transport demand on the line Košice – Žilina – Bratislava, with growing number of passenger trains and higher rate of occupancy of the tracks. The main motive for the alternate routing may be the Vrútky - Žilina section, with the highest occupancy (> 60%), because in terms of the actual growth rate in the number of the passenger trains, the capacity of the section may be inadequate in the future.

Figure 6 Railway lines in Žilina region

Table 9 – Sections with insufficient capacity on the railway network in the Žilinský selfgoverning region

No:	Sections according to the table 10 z D.T3.2.2	Occupation	Is solved by the construction
1	Vrútky - Diviaky	135,3%	Increasing the capacity Vrútky - Diviaky
No:	**Sections according to the table 3 z D.T3.2.3 including an increase to 2030**	**Occupation**	**Is solved by the construction**
2	Vrútky - Žilina	110%	Modernization of infrastructure, line security and transition to 25kV electrification
3	Žilina - Bytča	110%	Modernization of infrastructure, line security and transition to 25kV electrification within Žilina node

Note: The order of constructions in the table corresponds to the order of priorities of the solution of key sections

3. BUDGET OF SELECTED PROJECTS

3.1. Czech republic

Table 10 – Estimation of costs of proposed constructions on the railway network in the Moravian-Silesian region

No:	Section	Proposed by	Costs mln. Euro
1a	High speed line Přerov - Ostrava	MDCR	3200 mln Euro
1b	Increasing of capacity Přerov - Ostrava	Trans Tritia	500 mln Euro
2	Conversion from DC to AC and ETCS Hranice ČR/SR - Chotěbuz	MDCR	200 mln Euro
3	Reconstruction of Ostrava node	MDCR	300 mln Euro
4	Increasing the capacity Pudlov - Chalupki	MDCR	50 mln Euro
5	Electrification and Doubling of tracks Ostrava – Frýdek-Místek	MDCR	200 mln Euro
6	Conversion from DC to AC and ETCS Český Těšín - Ostrava - Kunčice	MDCR	100 mlnl Euro
7a	Increasing of capacity switch Odra - Ostrava-Svinov	MDCR	50 mln Euro
7b	Connection Vratimov- Ostrava-Bartovice	Trans Tritia	100 mln Euro

Note: MDCR – Ministry of transport Czech republic

3.2. Poland

Table 11 – Estimation of costs of proposed constructions on the railway network in theOpole and Silesian voivodeship

No:	Section	Proposed by	Costs mln. Euro
1	Herby Nove - Klobuck	PKP PLK	220 mln Euro
2	Opole Groszowice - Kędzierzyn-Koźle – Katowice - Trzebinia	Trans Tritia	1000 mln Euro
3a	Tychy - Pszczyna	PKP PLK	230 mln Euro
3b,8b	High speed line Katowice - Ostrava	Trans Tritia	3000 mln Euro
4	Katowice Ligota - Mąkołowiec	PKP PLK	115 mln Euro
5	Strzebiń - Kalina	PKP PLK	220 mln Euro
6	Radzionków - Tarnowskie Góry - Zwierzynec	PKP PLK	220 mln Euro
7	Chorzów Stary - Bytom Północny	PKP PLK	210 mln Euro
8a	Zebrzydowice - Czechowice-Dziedzice	PKP PLK	345 mln Euro

Note: PKP PLK – Railway lines of Poland

3.3. Slovakia

Table 12 – Estimation of costs of proposed constructions on the railway network in the Žilinsky selfgoverning region

No:	Section	Proposed by	Costs mln. Euro
1	Modernization, ETCS, conversion from DC to AC Vrútky - Diviaky	Trans Tritia	300 mil. EUR
2	Modernization, ETCS, conversion from DC to AC Vrútky - Žilina	MDV SR	350 mil. EUR
3	Modernization, ETCS, conversion from DC to AC Bytča– Žilina node	MDV SR	300 mil. EUR

Note: MDV SR – Ministry of transport Slovak republic

4. SETTING THE ACTION/MONITORING GROUP

4.1. European level

The main challenges at European level to support the functioning of freight transport in the TRITIA region are:

- Uniform approval process for rolling stock
- Uniform authorization to drive interoperable locomotives on ETCS-secured lines

These two main tasks must be the subject of the structures of the European Union, which is responsible for issuing regulations valid for the entire territory of the Union and thus for all states in the TRITIA region.
The role is proposed for the team of the **European Commissioner for Transport.**

4.2. International level

4.2.1. Visegrád level

Due to the fact that there is no follow-up material to the White Paper that would relevantly assess the effects of the transfer of goods from road to rail to the rail network, it is proposed to compile such material. From a geographical point of view, the TRITIA region is the heart of the Visegrad region - the TRITIA region is the only territory of the Visegrad group where 3 Member States meet. A significant part of transports in the Slovakia - Czech Republic, Czech Republic - Poland routes pass through it and the Hungary - Poland route should be strengthened. It is proposed that, at the initiative of the Visegrad Group, the ministries prepare:

- Analysis of the impact of the implementation of the conclusions of the EU Transport White Paper of 2011

Assurance of the role is proposed for the **ministries of the V4 group** with the mediation activities of the **EGTC TRITIA** entity.

4.2.2. TRITIA level

EGTC TRITIA is not designed to ensure interconnection between entities, especially ministries and regional authorities, from the Czech Republic, Poland and Slovakia in solving problems that require the participation of entities from several countries. At the same time, a continuous control of the implementation of plans for the TRITIA region would be carried out.

4.2.3. Bileteral level

Given the fact that the adoption of regulations at European level is a longer-term process in the field of rail transport, it also makes sense to develop activities at bilateral level. Arrangements to allow, before the framework of a European Union regulation, to establish in the territory of the Visegrad Group:

- Recognition of rolling stock approved by the Authority in another Visegrad country

- Recognition of the authorization to drive interoperable locomotives on ETCS-secured lines in all of the Visegrad countries

Ensuring the role is proposed for the **ministries of the V4 group** with the mediation activities of the **EGTC TRITIA** entity.

4.3. Regional level

Public entities

At the level of individual states, it is necessary to ensure and monitor the term fulfillment of investment plans and their supplementation with constructions that increase railway capacity to the required level. Due to the fact that freight transport is not the responsibility of individual regions, as well as constructions on the railway network, it is necessary that the tasks be provided by the **Ministries of Transport** of individual states, because the bodies of the Visegrad group cannot administer these tasks directly.

Private entities

Cooperation with **railway freight transport associations** in each country (CZ - ŽESNAD, PL – ZPKP, SK – AROS) is considered meaningful, as these associations usually have information on real capacity problems, can propose effective solutions and are the target group whose work is to evaluate traffic flows and eliminate bottlenecks. They can thus act both as an opponent and as a source of valuable information. If necessary, other entities, such as **chambers of commerce**, may be invited to cooperate.

5. ACTION STEPS

5.1. Legislative

In order to support the transfer of goods from road to rail, it is necessary to harmonize the conditions for rail and road, especially in transport infrastructure charges. Due to the fact that combined transport will develop the most in the future, the amendment of Directive 92/106 / EEC for combined transport has not yet been completed.
In particular, the **rules of Commission Regulation (EC) No. 62/2006 on the technical specification for interoperability relating to the telematics applications for freight subsystem** of the trans-European conventional rail system (hereinafter referred to as "TSI-TAF") need to be consistently **implemented** on the PKP PLK and ŽSR network. was amended by **Regulation (EC) No 1305/2014** of the **TAF-TSI** and Regulation (EC) No 2019/778). This Regulation describes the Infrastructure, Control-Command, Rolling Stock, Traffic Operation and Management subsystems. Due to the fact that SŽ, s.o. is the furthest in the application of the rules and PKP PLK and ŽSR do not yet have all the rules in place, there are problems related to cross-border traffic management - this concerns the harmonization of timetables - problems with traffic management in exclusions, viewing international train routes as one route leading through the territory several states and not several routes (one route in each state), etc.

Unification of conditions in regulations related to railway traffic management

- Unification of conditions for **route requests and allocation of track capacity** between SŽDC and PKP PLK - shorten waiting, unify conditions regarding train parameters when submitting an application outside PCS
- Charging for stays in **cross border stations on the SŽ network** is being prepared, ie in Petrovice u K. - depending on who causes the delay, it will apply (either the carrier or the infrastructure manager of SŽ)
- SŽ and PKP PLK, in cooperation with carriers, will **ensure in regulations** that **carriers must cooperate more closely with the carrier in the other state**, especially regarding the transmission of information on where the train is on the PKP PLK network and when locomotives and drivers need to be prepared for their delivery to the TSO and, if necessary, to provide this information to the CDV in Přerov
- Unify **timetables**, ie. **harmonize routes across the border, dates of timetable changes**
- Unify the **lifetime of the train path** (validity period - now for SŽ it is 20 h and for PKP PLK it is 24 h)
- Take into account in the regulations that one train arriving at the cross border station from the PKP PLK network (multi-carrier load collection train) is divided into several parts in the cross border station for different carriers and more trains are created that run through the cross border station separately
- Unification of the **terms of exclusions on the lines** of SŽ and PKP PLK, which are led to cross border station and possibly other connecting lines for international freight transport
- Unification of **time reserves for train delays** at SŽ and at PKP PLK.
- To support the development and acceleration of international rail transport between SŽ and PKP PLK, conclude a bilateral agreement on the harmonization of **information systems for railway traffic management PKP PLK and SŽDC and, within the update of the Railway Declaration (Regulamine network)** 2020/2021 approval of timetables, shorten the deadlines for the allocation of ad hoc routes by PKP PLK for the possibility of train departure from cross borde stations in less than 8 hours after the submission of the application.
- Agree on the recognition of authorization to drive locomotives between states and not wait for this to happen at European Union level. Drivers from the other state should always be able to reach at least a hub where hauliers have manpower at their disposal, in order to avoid additional costs due to the need to transport permanent depots.

on the part of **PKP PLK**:

- ensure **full implementation** of the EU regulation concerning the **TAF TSI on the PKP PLK network**
- for **ad hoc routes** - shorten the time of 8 h for a freight train, when it is possible to leave with it after the route has been allocated, and also for a locomotive train (now 3 h)
- ensure the amendment of the regulations concerning the **uniform identification of the train - ie the introduction of international train numbering** on the PKP PLK

network from the time the train is assembled and its departure from the station of departure

- **change the charges for the use of the transport route** - to pay for the route traveled, regardless of whether it will be implemented in one or two or more days (ie the charge only once)

5.2. Organization

In order to speed up the removal of obstacles at border crossings, which often determine the economy of transport and form a substantial part of transport, it is proposed to implement organizational measures that can be taken much faster than legislative measures approved in the standard way.
A frequent feared complication in recent years is the concurrence of exclusions within mirror cross border stations (those exclusions that further reduce the permeability of such a pair of cross border stations), on the contrary, exclusions made to each other in eclipse, eg in the same track are welcome, as it saves time on the excluded track. The concurrence of exclusions has an adverse effect, which in the case of acting in one cross border station with this in parallel also on the loading of the cross border station (they complicate the diversion carriage).
The carrier knows about the problems at the cross border station, so it tries to take them into account already in the planning. The withdrawal of trains from the border (Chalupki) and their subsequent departure from a new location (Ostrava) seem to be more flexible in this. Otherwise, due to the delay of the Polish carrier, there is a risk of disintegration of the route in the following countries (Austria, Italy). The situation works similarly for trains brought to the border, with the proviso that if the route falls in this situation, Poland is usually the destination country.
<u>The solution to eliminate these phenomena are the following factors:</u>

- Mutually true multilateral information on the approach of trains to the border and the readiness of resources from the other party (downstream carriers).
- Introduction of the service of train hauls by smooth running through cross border station - at least during operational complications - ie due to reduced throughput by lockouts or when the accumulation of trains does not allow the achievement of standard (usual) times during handover
- Possibility of crossing the border by train with the same locomotive (provided to the connecting carrier), or the same driver (for this idea the existence of simplified regulations, even further than just the mirror cross border station, eg to the nearest larger node, station, etc., uniform language on such a section).

<u>Check-in of trains on transport trust - GonG agreement system</u>
This multilateral agreement on freight train journeys without a long stay at the border (hereinafter referred to as GonG2) on trust means that trains run on so-called "trust" (both neighboring infrastructure managers have committed that trains can run over cross border stations without stopping and having to transport and technical inspections, as the carrier should guarantee that the transport documents of the train are in order and also in terms of the technical condition of the wagons the train complies and therefore there is no need for these trains to stop at the cross border station.

The data are transmitted to each other in electronic form in the prescribed format (this is the basic premise of this type of train check-in). The handover of transport documents takes place only administratively, without control. Today, such a system is introduced and successfully used in the relation of combined transport trains Lovosice - Duisburg, when the essentials, ie. the driving vehicles of the transferring railway carrier run with trains to the Pirna station. In this case, the passage through the cross border station is considered to be the moment of handover of the train.
Also AWT, a.s. (now PKP Cargo International, as) as part of the Polish carrier has ensured that some trains are run by locomotives (meeting the homologation on the SŽ network) directly across the border to the Ostrava - Kunčice railway station to avoid long train delays at cross border station Petrovice u Karviné. It is therefore not necessary to switch locomotives.

Recommendations for improving the throughput of border stations
(until the introduction of a modern IS for cross-border traffic management on the part of PKP PLK):
For infrastructure managers - SŽ or PKP PLK:

- Give Czech (Polish) carriers, as a condition for allocating track capacity (including ad hoc routes) and allocating a train path in the direction of Poland (to the Czech Republic), the obligation to obtain information by telephone from their foreign partner (carrier) on train composition, train position (eg approx. 3 - 5 hours before his arrival to cross border station), time. the position (range) of the disposition of the traction vehicles for the takeover of the next train from the Czech side, the disposition of the drivers until the PKP PLK will have a modern IS in place enabling such data transmission automatically.
- Another condition for the allocation of track and train path capacity should be to attach to the application a document describing the technology to be implemented in the cross-border station.
- Put the carriers in the conditions that in the last station, in which the whole train is built or the last wagons are connected, it will perform a proper technical inspection of the train and discard the wagons unfit for operation (maintenance wagons). To avoid unnecessary shifts and extensions of stay in the cross-border station.
- Introduce fees for train stays in cross-border station (on the SŽ network) and not give too much time. reserves for train departures from cross border stations due to the shortening of train stays in cross-border stations, because drivers abuse it - they block traffic tracks unnecessarily and thus throughput in cross-border stations.
- Limit the number of issued allocated capacities and train routes for days when closures are planned on the 305 Dětmarovice - Petrovice u K. line or in the Petrovice u K. railway station and the neighboring cross border station Zebrzydowice and the adjoining Polish line.
- Harmonize the time validity of international timetables. trains, including ad hoc routes (SŽ and PKP PLK) for cooperating Czech and Polish carriers (partners). PKP PLK should shorten the time between the time of allocation of the train path and the actual departure of the train from cross border station. SŽ and PKP PLK in cooperation with carriers should harmonize the JR of cooperating Czech and Polish carriers - to allow, if possible, the arrival of trains to cross border station from both networks at approximately the same time due to the harmonization of locomotive crossings.

- For PKP PLK, introduce international numbering for domestic trains so that they can be better identified and paired in advance in relation to a foreign route already when running on the PKP PLK network.

For carriers:
Closer cooperation with Polish partners who carry out part of the transport on Polish territory, ie to provide Czech carriers with sufficient information on the position of their train and its composition (these are trains that continue on Czech territory) until it is introduced modern information system PKP PLK, which will enable data transmission. Mainly in order for the partner to secure the traction vehicle in time for the overhang. This is related to the harmonization of timetables - the ideal situation occurs when trains from both countries arrive at both neighboring border stations at approximately the same time. This information should be provided by the CDP in Přerov, from where cross border train transport is managed in relation to the PKP PLK.
And also, on the contrary, for Czech carriers to report to Polish partners information on the position of their train and its composition with sufficient time. in advance of arrival at the cross border station on the Czech side.

5.3. Investment

By 2030, it is necessary to comply with all planned investments according to output D.T3.2.2. Table 3 and Table 4. It is also necessary to solve insufficient capacity according to D.T3.2.2 table 10

Beyond investments according to output D.T3.2.2. Table 3 and Table 4, for the necessary transfer of traffic, it is necessary to take the following additional measures on the railway network or postpone the deadline for the following planned constructions:

5.3.1. Czech republic

1a - High-speed line Přerov – Ostrava
This is a state-planned construction that will enable the diversion of approximately 3 long-distance passenger trains per hour from the existing Přerov - Ostrava line by 2030, thus creating a new capacity for freight transport.

1b – Increasing of capacity of the line in the section Přerov – Ostrava
Due to the fact that this section is marked as a bottleneck for freight transport today, it will be necessary to increase the capacity of the track at least by adding the 3rd track. The line is already beyond the capacity limit not only when performing maintenance, but also during rush hours in passenger transport, which last for several hours. This creates large time constraints when freight trains cannot be traced reliably. According to the figure 5 and the assumption that it will be possible to transfer about 3 long-distance trains every hour thanks to the new high-speed line, the created space will cover only the planned increase until 2030. Compared to 2020, there will be no qualitative shift in the reliability of the current route and the average speed will not increase.
2 - Increasing of capacity of the line in the section Cottbus - Czech / Slovak border
Due to the fact that this section is marked by the model as a bottleneck for freight transport after the transfer from road transport in 2030, it is necessary to increase the capacity,

preferably the 3rd track. However, the section is territorially unfavorable and it will probably not be realistic to add a 3rd track in the whole section. Given that by 2025 there should be both ETCS and 25 kV / 50 Hz AC, it will be possible to assess the impact on capacity increase and take action subsequently. However, due to its importance, it is recommended to start incorporating the reserve for the 3rd track, because both passenger suburban and long-distance transport intersect in the section, which further intensifies traffic in this section, in contrast to sections at state borders.

3 - Modernization of the Ostrava node

The construction is listed due to the fact that its implementation is currently postponed to 2030. In such a case, there will be problematic places behind Ostrava-Svinov in the double-track section across the Odra River and at the main railway station, where the bottleneck are turns to Ostrava-Kunčice and Frýdek-Místek. At the same time, the construction of the high-speed line Přerov - Ostrava will not solve the mentioned place, because it ends before this section.

4 - Increasing of capacity of the Pudlov - Chalupki line

As part of previous reconstructions, the line capacity was devalued by removing switches, which made it impossible to use the line in double-track mode, but only as 2 separate single-track lines. By re-inserting the canceled switches, the required increase in capacity is achieved.

5 - Double-tracking of the section of the Ostrava-Kunčice - Frýdek-Místek line

Electrification and double-tracking have been prepared at least since the 1980s, and space reserves have already been created in some places. It is almost impossible to carry freight trains for industrial zones on a single-track non-electrified line during passenger transport, and there is no alternative route at the time of exclusion.

6 - Conversion of the supply system from 3 kV DC to 25 KV-50Hz AC Český Těšín - Ostrava-Kunčice

The section has a very different cast in even and odd directions. The solution to the problem is assumed by the planned conversion of the power supply system and the connection of the tracks in the direction of Albrechtice and Karviná, which will create a full-fledged 3-track line in part of the section.

7a - Capacity building of the line in the section Odra branch - Ostrava-Svinov

The line section is the only dead end connecting several industrial zones and two terminals of combined transport for export and import in the direction of Poland, at the same time there is suburban passenger transport, which complicates freight transport during the day. It is necessary to perform at least soldering of the tracks on the Odra branch or, in the best case, double-tracking of the entire section.

7b - Line connection Vratimov - Ostrava-Bartovice

The construction was planned for decades in connection with the rides of coal trains in the hard coal mining area. Its design is essential for container train rides from the intermodal terminal in Paskov and the carriage between the cooperating car manufacturers KIA in Žilina and Hyudai in Nošovice.

5.3.2. Poland

1 - Modernization of the Herby Nove - Klobuck line
This is a section of the so-called coal highway, which is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

2 - Capacity building of the Opole Groszowice - Kędzierzyn-Koźle - Katowice - Trzebinia line
These are sections of lines that run in parallel with the A4 motorway and are on the race of the largest traffic load in the TRITIA area. After the planned reconstructions and attractiveness of passenger transport, an increase in passenger transport can be expected, together with the planned increase in freight transport and very strong transfer of traffic from A4, the capacity of two tracks will not be sufficient and it is necessary to supplement the third track or freight trains with parallel routes. could be more expensive to invest due to the situation on other lines. The addition of a third track is primarily considered.

3a - Modernization of the Tychy - Pszczyna line
This is a section that is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

3b - High-speed line Katowice – Ostrava
The section is run in parallel with the A1 motorway, where some of the highest values of the transfer of goods from road to rail transport are assumed. Insufficient capacity of the Tychy - Pszczyna line is thus assumed, which is burdened by suburban traffic even after the modernization. At the same time, it should be recalled that due to the longer reconstruction in the Katowice - Zebrzydowice section, some trains are diverted and at the time of this study the data provided for the current traffic intensity was lower than it would have been without modernization work. The high-speed line is designed for combined operation, as sufficient economic potential is not expected on the cross-border section only from passenger transport.

4 - Modernization of the Katowice Ligota - Mąkołowiec line
This is a section that is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains. The reconstruction of the parallel line is also essential, which can divert trains between the two stations and increase the connection capacity.

5 - Modernization of the Strzebiń - Kalina line
This is a section of the so-called coal highway, which is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

6 - Modernization of the Radzionków - Tarnowskie Góry - Zwierzynec line
This is a section of the so-called coal highway, which is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

7 - Modernization of the Chorzów Stary - Bytom Północny line
This is a section of the so-called coal highway, which is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

8a - Modernization of the Zebrzydowice - Czechowice-Dziedzice line
This is a section that is currently in poor technical condition and low throughput is caused by very low existing line speeds. A simple modernization thus solves the increase in the capacity of the line, which will be less occupied by standard trains.

8b - High-speed line Katowice – Ostrava (the same section as 3b)
Due to the fact that the line section will be used both for the transfer of traffic in the direction Ostrava - Katowice and for the transfer in the direction southwest - Bielsko-Biala - Krakow, where insufficient line capacity is expected even after the modernization in the section Zebrzydowice - Czechowice-Dziedzice. At the same time, it should be recalled that due to the longer reconstruction in the Katowice - Zebrzydowice section, some trains are diverted and at the time of this study the data provided for the current traffic intensity was lower than it would have been without modernization work. The establishment of a high-speed line, which is currently being considered for combined transport, will significantly lighten this section.

5.3.3. Slovakia

1 - Modernization, ETCS and conversion from 3 kV DC to 25 kV-50Hz AC Vrútky – Diviaky
The capacity problem arises in 2030 due to the potential shift from road to rail in this section. The increase in capacity in the section can be solved by electrification (Martin - Diviaky), modernization of the railway line, which means optimization of directional and height lines, increase of operating speed to 160 km / h, electrification of AC 25 kV and introduction of ERTMS security system. A suitable project can be designed only after a detailed analysis of the problem on the track.
In order for freight trains to really get on the line, it is necessary to assess the entire transit route from Hungary to Poland via Zvolen, Žilina and Čadca, because there are several single-track sections with low capacity and high longitudinal slopes on the route. First of all, it is necessary to prepare a study that will solve the adaptation of the entire traction for the carriage of freight trains with a length of 700 m.

2 - Modernization, ETCS and conversion from 3 kV DC to 25 kV-50Hz AC Vrútky - Žilina
The capacity problem will be eliminated by 2030 thanks to the modernization of the line, the increase of the operating speed to 160 km / h, the electrification of AC 25 kV and the introduction of the ERTMS security system.

3 - Modernization, ETCS and conversion from 3 kV DC to 25 kV-50Hz AC Žilina - Bytča
The capacity problem will be eliminated by 2025 thanks to the modernization of the Žilina node, the increase of the operating speed to 160 km/h, the electrification of AC 25 kV and the introduction of the ERTMS security system.

6. TIMETABLE

6.1. Monitoring groups

Table 13 – Proposed structure of monitoring groups

LEVEL		DESCRIPTION	PERIOD
European		Uniform driving license Unified vehicle approval process	2021-2025
International	Visegrad Group	Start of the impact assessment process of the EU White Paper on Rail Transport	2021-2023
	EGTC TRITIA	Coordination of activities within the cross-border region on the self-governing regions level	2021-2030
	Bilateral	Bilateral recognition of locomotive driving licenses Bilateral recognition of the approval of interoperable locomotives	IMMEDIATELY

6.2. Investment

6.2.1. Czech Republic

Table 14 – Proposed dates of track construction in the Moravian-Silesian region

No:	Section	Proposed by	Start of operation
1a	High speed line Přerov - Ostrava	MDCR	2030
1b	Increasing of capacity Přerov - Ostrava	Trans Tritia	2030
2	Conversion from DC to AC and ETCS Hranice ČR/SR - Chotěbuz	MDCR	2030
3	Reconstruction of Ostrava node	MDCR	2035
4	Increasing the capacity Pudlov - Chalupki	MDCR	2024
5	Electrification and Doubling of tracks Ostrava – Frýdek-Místek	MDCR	2025
6	Conversion from DC to AC and ETCS Český Těšín - Ostrava - Kunčice	MDCR	2030
7a	Increasing of capacity switch Odra - Ostrava-Svinov	MDCR	2030
7b	Connection Vratimov - Ostrava-Bartovice	Trans Tritia	2030

Notes: No:3 is necessary to accelerate to 2030. MDCR – Ministry of Transport of the Czech republic

6.2.2. Poland

Table 15 – Proposed dates of track construction in the Opolske a Śląskie voivodeship

No:	Section	Proposed by	Start of operation
1	Modernization Herby Nove - Klobuck	PKP PLK	2030
2	Opole Groszowice - Kędzierzyn-Koźle – Katowice - Trzebinia	Trans Tritia	2030
3a	Modernization Tychy - Pszczyna	PKP PLK	2022
3b,8b	High speed line Katowice - Ostrava	Trans Tritia	2030
4	Modernization Katowice Ligota - Mąkołowiec	PKP PLK	2022
5	Modernization Strzebiń - Kalina	PKP PLK	2030

6	Modernization Radzionków - Tarnowskie Góry - Zwierzynec	PKP PLK	2030
7	Modernization Chorzów Stary - Bytom Północny	PKP PLK	2030
8a	Modernization Zebrzydowice - Czechowice-Dziedzice	PKP PLK	2022

Note: PKP PLK – Railway lines of Poland

6.2.3. Slovakia

Table 16 – Proposed dates of track construction in the Žilinský selfgoverning region

No:	Section	Proposed by	Start of operation
1	Modernization, ETCS, conversion from DC to AC Vrútky - Diviaky	Trans Tritia	2030
2	Modernization, ETCS, conversion from DC to AC Vrútky - Žilina	MDV SR	2030
3	Modernization, ETCS, conversion from DC to AC Bytča – Žilina node	MDV SR	2025

Note: MDV SR – Ministry of transport Slovak republic

7. CONCLUSION

Based on the information obtained in the framework of the elaboration of part WP2.2 and with regard to the plans for the construction of railway infrastructure of individual states, it is recommended:

- meet all planned deadlines according to chapter 6.2.
- to accelerate the preparation of sections of the railway system in the TRITIA region, where in 2030 it is not and will not be fully eligible for the required transfer of traffic according to the EU White Paper at least in the following sections:
  - Přerov – Ostrava
  - Vrútky – Diviaky
  - Opole - Katowice – Kraków
  - Katowice – Ostrava
- by 2025, prepare a study that will solve the complicated permeability (specifies modifications) of the Czech-Polish-Slovak three-border railway lines by freight trains due to large longitudinal slopes, which currently leads to the bypass of the Žilina - Czech Republic (Poland) route via the Břeclav - Bohumín route and complicates the transfer of traffic in the tri-border region
- make legislative adjustments by 2025 that will support the transfer of transport in the 2030 horizon
- make adjustments to infrastructure charging from 2025 in order to transfer traffic to the 2030 horizon
- prepare the legislative and pricing policy for the arrival of trucks with new engine systems by 2025, which will reduce the costs of road transport by tens of percent and without a legislative and price reaction will cause freight transport to return from rail to road by 2030, or that transport at all will not be transferred.